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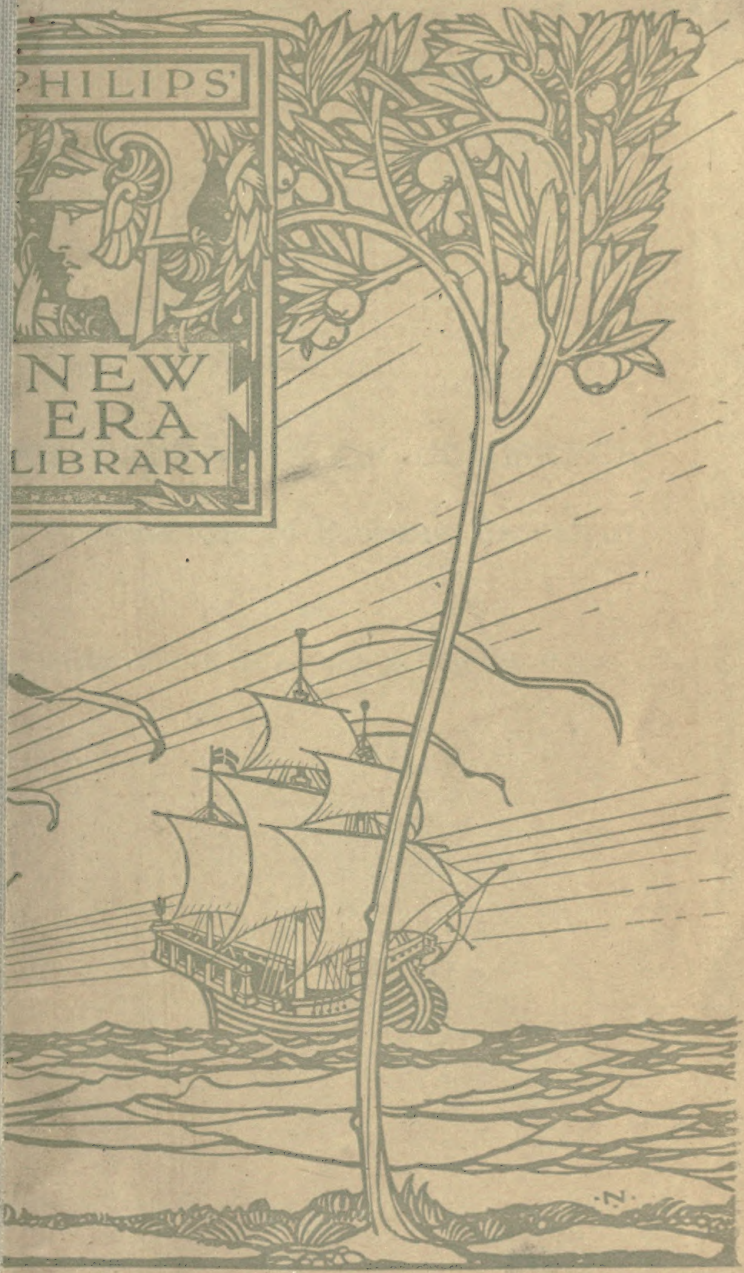

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THE GATEWAYS OF COMMERCE

An Introduction to Economic Geography

BY

J. FAIRGRIEVE, M.A., AND E. YOUNG, B.Sc.

NEW ERA LIBRARY

THE New Era Library represents an attempt to meet the demand on the part of the general reader for works which are, frankly, merely introductions to a subject and not indigestible tabloid primers. They give in broad outline something of the main principles and sphere of activity of the subject covered by the title or sub-title. They do not profess to be encyclopædic in character, and they assume little if any previous knowledge on the part of the reader.

The explanations are in each case full enough to permit a person, unaided, to get a wide general view of some important topic, unburdened with excessive detail, in order that the larger classical works may afterwards be the more easily attacked by those who desire to pursue their studies further.

In these days it is necessary for the man in the street to know a little of many things. Our aim is to present 'that little' in such a way that it is easily assimilated, and yet so accurate that nothing has to be unlearned at a later stage.

THE GATEWAYS OF COMMERCE

By

J. FAIRGRIEVE & E. YOUNG

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INTRODUCTION

HE chief aim of this book is to build up a picture of the world on its economic side. There are plenty of books which deal with the details of imports and exports and the origin of commodities. In this volume the attempt has been made rather to see what economic geography means, and to emphasise the facts that are really important for each citizen to know.

In view of the uses to which the book may be put in continuation-school work, it has been thought well to make each chapter self-contained, but the discerning will note that the order of the subject matter is not haphazard. Not only is there the order suggested in the titles of the chapters, but there are other sequences. Simple ideas are introduced before the more complex; the whole of Part I. is simpler than Part II.; and each chapter is in some degree a development out of those that precede it.

There is also a geographical order. Chapters I. and II. may be considered as forming an introduction giving a summary of the world distribution

of important factors; Chapters III. to IX. deal with Britain and the surrounding seas, being physical and agricultural in the earlier chapters and industrial in the later; in Chapters X. to XII. the outlook is broadened to take in the world, but there is special reference to the United States; Chapter XIII. is in the nature of a Summary to Part I.

In Part II. the matter is somewhat more advanced than in Part I., partly because the outlook is over the whole world, and partly because the ideas considered separately in the first part are incorporated in the discussions. There is thus a series of threads running through the volume.

Note.—Statistics are nearly all pre-War, and are therefore of little absolute importance, but as post-War statistics are not comparable, even when available, the pre-War statistics give a truer picture of relative values than is possible by the use of others.

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PART I

I

WHERE THINGS GROW: THE GEOGRAPHICAL CONTROL

HIS book deals with the geography of commerce or trade, and trade cannot be carried on without the help of human beings. Animals and plants do not trade with each other. But human beings are themselves dependent on the soil and could not live, much less trade, if Nature did not, in the first instance, provide them the possibility of existing. The land is the one and only source from which we obtain food, clothing, shelter, and all the other things that we use as long as we live in the world. We depend upon the land as much as do the birds and beasts, the trees and the flowers, and apart from it we could not live at all.

But the land does not provide us with the same means of living in each and every part of the world. There are differences of soil; differences of climate—from great heat to intense cold, from unceasing moisture to unbroken drought—and all these differences give rise to those differences of vegetation which mean so much to the occupations, the habits, and even to the thoughts and

characters of human beings. And therefore the basis of trade is geographical, first because it is the geographical conditions that make life possible at all, and, secondly, because owing to the different geographical conditions in different parts of the world different things are produced in different places ; it is the exchange of one kind of product for another that is trade.

Pictures and travellers' tales have made us all familiar with the wonderful variety of plant life that exists upon the surface of the earth. Except on the barren deserts, upon the wastes of the polar ice, or upon the snow-crowned summits of high mountain peaks, there is no part of the land surface of the globe that does not present us with wide stretches of vegetation. The plants vary in size, from the tiniest of mosses to the giant conifers of North America, from blades of grass to stately palms. And we are all well aware that these differences in size and form and abundance are somehow connected with the conditions under which the plants grow.

HEAT.—Every plant, according to its kind, requires a certain amount of heat at every stage of its life, but there appears to be scarcely any part of the earth's surface where it is too hot or too cold for some form of life to exist. At Yakutsk, in Siberia, the temperature falls 112 degrees below freezing-point (Fahrenheit), and yet, even there, 200 species of plants are known. On the other hand, there are lichens that grow in the desert where the temperature may rise to 140° or even 160° F. The mosses of the tundra, the conifers of the northern forests, and the palms of the tropics each need heat in a different degree.

The *amount* of heat which a plant receives is important, but it does not seem to matter much

whether this amount is received in a long or a short time provided it is received. For instance, wheat is harvested in India in 3 months after it is sown, in Palestine in 5 months, in Central Europe in 9 months, in Yorkshire in 11 months, and in Scotland in 13 months.

MOISTURE.—All plants require water, and upon the presence or absence of this depends whether the natural vegetation of any area is forest, grass-land, or desert. The mineral part of the food needed by plants is taken in at the roots in a very weak solution; if the solution be strong it acts as a poison and causes death, not life. If the solution has to be a weak one, then the amount of water that must be absorbed, in order that the plant may obtain a sufficiently large supply of mineral food, must be very great. The excess of water is got rid of through the leaves by a process called *transpiration*. On an average, an ordinary field-crop transpires 300 lbs. of water for each pound of dry matter produced. And a beech wood that is about 50 to 60 years old will give off, during the growing season, 354 *tons of water per acre!* In desert regions, where supplies of moisture are small, the plants have special contrivances, such as coatings of hair or wax, or very thick skins, in order to reduce the amount of transpiration and so conserve the moisture which they receive through their roots.

The importance of the *soil* depends partly upon its *texture* and partly on the *food* that it contains.

TEXTURE.—Soils are produced by the waste of the rocks, and consist of masses of particles varying much in size, and of *humus*, the dark-brown substance which comes from the decay of animal and vegetable matter. The texture of the soil depends

Fig. 1.—World: Rainfall

This map shows the average rainfall for the year. Notice how much rain there is in the equatorial regions

upon the sizes of the particles of which it consists. Where these particles are large, as in sandy soils, the texture is coarse-grained; where they are small, as in clay, the texture is fine-grained. The spaces between the grains are called the pore-spaces, and they contain either air or water or both. The part of the water in the soil which is of most use to the plant is that which coats the soil particles with a film; hence the amount of useful water which the soil holds depends on the number of particles and the areas of their surfaces. The particles in one cubic foot of ordinary light loam have a total surface of about an acre. This area is greater in clay and less in sand. Experiments have shown that 100 lbs. each of sand, clay, and humus are able to retain about 25 lbs., 50 lbs., and 200 lbs. of water respectively.

All this is of great importance. In a sandy soil the water runs away quickly between the large particles and is lost. Then, if there is no rain for some time, the soil becomes very dry and some plants are unable to live.

Water takes longer than land to absorb heat and thus rise in temperature. In the same way a soil which contains much water will require more heat than a dry soil before its temperature is high enough to permit seeds to germinate or fruit to form. Clay and humus are for this reason 'cold' soils, while sandy soils are 'warm.' It takes about twice as much heat to raise wet clay to a given temperature as it does to raise sand. On the other hand, water cools more slowly than land, and clay cools more slowly than sand in the autumn.

FOOD.—The soil is a reservoir of food supplies. It contains silica, lime, soda, potash, nitrogen, and phosphoric acid, and, without one or other of

Fig. 2.—World: Forests

these, plant life would not thrive. A perfect soil would contain clay, chalk, sand, and humus. The clay has the property of holding potash, phosphates, and ammonia; the chalk is also a food, and in addition prevents the soil from becoming sour; the sand is not a food, but adds lightness of texture and improves the drainage. Humus gives fertility and richness; the greater the amount of decayed organic matter there is in the soil the greater the productiveness. The decay of the humus not only produces plant food but it makes the soil warm and helps to conserve moisture.

For the sake of illustration let us now consider *timber* and *rice.*

TIMBER.—We have already seen that plants need huge quantities of water to carry to them, through the roots, in weak solution, the minerals that they need for food, and that the excess of water is got rid of by transpiration through the leaves. Now transpiration in trees is a rapid process, as a rule, for the upper part of the tree is in a layer of the air drier than that next the ground, the tree itself is of large volume, and it possesses numerous leaves. But the more water it gives off the more it requires, and therefore trees can only grow in places where moisture is abundant; a map of the world showing the regions where rainfall is heavy would also show the places where quick-growing forests flourish.

Such regions are the *selvas* or *equatorial rain forests.* These are found along the Amazon and Congo valleys, in Burma, Assam, Bengal, and the East Indies—that is, wherever the climate is hot and wet. In these regions it may rain daily throughout the year or there may be dry seasons of two or three months broken by heavy storms. The tem-

perature varies very little, from 70° to 85° F.; the light is dazzling. Under these conditions growth never ceases, and at any time of the year one may see, close together, trees bursting into leaf, others shedding their leaves, some gay with flowers, and others bearing fruit. Stanley, describing the Central African forest, says: 'Imagine a space of earth four times the size of England, Scotland, and Wales, crowded with colossal trees from 1 to 5 feet in diameter and 200 feet in height, with their thick glossy foliage so interlaced that the hot, glaring sun of the tropics is quite shut out, and each tree seemingly lashed to the other by endless lengths of numberless cables, ranging from the tender thread-like creepers to the thickness of the old hempen hawsers of a line-of-battleship . . . presenting a maze of curious meshes, festoons, loops, and slack ropes. . . . And underneath the thick, impervious shades is the impenetrable undergrowth, often of such close growth that you fancy you could travel best above the tops rather than through it.

'Let the ground be fat and black, like rich hot-house soil; let the vines be of the greenest, and the wrinkled bark of the giant trees be of the greyest; let the air be suffocating; let the vapours rise in blue clouds, thinly veiling the six-fathom thick foliage about; let the murmur of insects above, below, and around be heard, indicative of the seething life that finds existence in the hot, damp shades. Then imagine yourself dazed and mazed in this weird shadowland, and marching from dawn to dark in a perpetual duskiness, lit at rare intervals by a little ray, or the flickering dust of sunlight, and you will have a dim idea of the forest of Darkest Africa.'

There is another kind of forest where the ground

is damp all the time because there is little evaporation. This is the *sub-arctic forest*, a far different kind of forest, mainly of conifers, which stretches in a broad belt across the north of America, Europe, and Asia. Here, instead of a multitude of species, there are only pines, firs, spruces, and larches, with occasionally birches and aspens. The climate is cold, especially in the winter, and the soil is poor, but there is an adequate supply of moisture during the growing season. As the winter is severe and the amount of food in the soil is scanty, growth is slow. The leaves are reduced to mere needles, with thick leathery skins, to prevent loss of moisture. The general build of the tree is conical, a form which enables it to shed part of its heavy winter burden of snow and withstand the attack of the violent winter gales. During the winter the snow covers the ground and preserves the roots from frost; in the spring it melts and supplies the water necessary for growth. During the winter, when the cold is intense and moisture not available, growth ceases. From these forests come the soft timber supplies of the whole world. The chief occupation they provide is lumbering, *i.e.* felling the timber. The logs are floated to the sawmills by the natural power of the streams and then sawn into planks by machinery that is driven by the same form of power.

RICE.—Rice is one of the most important food plants we possess, and as millions of people live mainly upon it, it must grow somewhere or other in great abundance. Rice is a plant that requires a considerable amount of warmth and, at certain stages of its growth, an abundance of water. It grows in the Plain of Lombardy, and is becoming increasingly important along the Gulf Coast of

the United States of America, but its home is in the monsoon lands—China, Japan, India, Indo-China, and the East Indies. In these countries it is warm all the year round ; the rain is brought by the monsoons at the hottest time of the year. Rice is grown, during a great part of its life, actually in water, and therefore flat land is necessary. Further, a light fertile soil is required. All these conditions—heat, moisture, and fertile level ground—are found in the deltas of the great tropical rivers ; their plains and swamps are the natural rice grounds of the world.

In the case of the forests, both equatorial and sub-arctic, though care and attention improve the output, man does little but cut the timber for his use. But in the case of rice, though the plant will grow in suitable conditions, yet man has to lend a hand if he wishes to reap abundantly. Rice cultivation for home use rather than for export is well seen in Siam. Land is cleared by burning down the trees and ploughed with a wooden plough drawn by buffaloes. The peasants depend for moisture upon the chance rise of the rivers during the wet season to flood their fields. There is very little artificial irrigation. The floods not only inundate the low-lying plains but, when they subside, leave behind a deposit of mud so rich and fertile that manuring is rendered unnecessary.

The natives of Siam divide the different kinds of rice into two classes, 'Garden rice' and 'Field rice.' The latter is inferior in quality, and is scattered broadcast in the fields, where it is left to grow without any further care or attention being bestowed upon it. Garden rice, on the other hand, is carefully sown and tended. The seeds are sown thickly in well-watered patches. As

soon as the young shoots are a few inches high, they are pulled up by the roots, and transplanted in long, straight rows, in fields that have been covered with water, and trampled by buffaloes into a thick black mud. The roots of the young shoots are pushed into the mud, where they grow with amazing rapidity.

In these three examples, then, we see plants growing, each according to its kind, in just those conditions that suit it best:—

Equatorial forest	Hot.	Rain all the year round.	Growth never ceasing.
Sub-arctic forest	Cool.	Rain all the year round.	Growth slow; ceases in winter.
Rice . .	Hot.	Rain only in the summer.	Growth rapid.

And each plant would grow there and thus, whether man were on the earth or not. They do not need his help; he is powerless to alter their nature or their habitat. The only thing he can do is to introduce them to places where conditions are favourable for growth, or to modify these conditions to make them slightly more favourable.

The absence of some plants from certain regions may be due to conditions of neither temperature, moisture, nor soil, but to the fact that their seeds have never reached those regions, or that other plants grow much better there and so squeeze them out. There were, for instance, no potatoes in our islands till they were brought here from North America in the reign of Elizabeth, and there was neither wheat nor barley in North America until they were taken there by Europeans.

Of the modification of natural conditions we shall speak in the next chapter.

II

WHERE THINGS ARE GROWN: THE HUMAN CONTROL

N the last chapter we have tried to emphasise the importance of 'where things *grow*' quite apart from any action taken by man. The title of this chapter, 'where things *are grown*,' suggests the interference of man for some purpose of his own. That purpose can be roughly summed up as 'to pay'; man only comes on the scene to reap or to improve the natural harvests of the land when, as he says, 'it pays me to do so.' And it pays a man to exert himself first of all in order to procure more abundant or varied supplies for his own use, and later on to produce more than he requires for his own needs, in order that he may then exchange or trade his surplus for something which he does not possess and perhaps cannot produce.

As soon as man begins to grow things to pay he tries to modify the natural conditions. The great geographical conditions which were present before he came remain as they were, and, to a very large extent, he is quite powerless to alter them. Temperature and rainfall remain substantially what they were, though slight changes can be effected even in these. For instance, it is said, though it is difficult to prove, that the mean annual temperature of England has been

raised 2° F. by drainage; the tilling of the soil has an effect on the deposition of moisture, and Lord Strathcona gave it as his opinion that even the laying of the rail and telegraph lines of the Canadian Pacific Railway disturbed the soil to such an extent that it produced a distinct increase of dew and moisture in the immediate neighbourhood; it is known that one result of the construction of the Assuan dam on the Nile has been that, close to the reservoir, there is now a small annual rainfall where previously there was none at all. But these results are so slight and so few that they may all be put on one side, and we may, for all practical purposes, say that man cannot get rid of the geographical conditions when he seeks to grapple with Nature for his own ends.

He can 'improve' the soil by manuring, drainage, and different ways of cultivating the ground, in order to make it more suitable for the particular crops which he wishes to grow. Moreover, he can remedy a deficient rainfall by various forms of artificial irrigation, and he can even supply heat in hot-houses. He can increase his rice crop by growing it on hillside terraces which he can flood or drain at pleasure. He can prevent other things growing on the ground which he cultivates, the presence of which would interfere with the results he desires to produce. But all this means the use of labour and the expenditure of money, and as man does not usually choose to waste either on unprofitable enterprises, we get back, every time, when considering where plants *are* grown, to the question of profit.

It is obvious that where the natural conditions are exactly suitable then the best paying results

are, other things being equal, likely to be obtained. But even under the most favourable conditions *labour* is required. And so, while we have laid down in the last chapter the principle that all life depends on the *land*, we have now to advance a stage further and to add that, in order to obtain from the land the many benefits which it provides for the use and the blessing of humanity, labour must be applied.

As an example of an earth gift grown with great profit in the most favourable conditions, but requiring much labour to obtain satisfactory results, we may take *tea*.

The examination of the contents of a teapot shows that we are dealing with leaves and, perhaps, stalks. And when we learn that during recent years the annual import of tea into the United Kingdom alone averaged 357,741,000 lbs., while Russia annually received 130,000,000 lbs., and the United States 941,813,000 lbs., to say nothing of the rest of the world, it is evident that the tea plant must grow in districts particularly suitable for the production of *leaves*. But leaves, as we have seen, are the organs through which plants get rid of excess of moisture, and so many millions of pounds of leaves must have transpired many more millions of tons of water, brought chiefly, of course, by rain. Hence tea must be a product of *wet* countries. Again, leaves, as we may have gathered from Stanley's account of the Central African forest, are particularly abundant where a heavy rainfall is associated with a high temperature. And so we come to the conclusion that tea must be a product of *warm* wet lands.

But these are the countries where rice is grown; the tea lands, like the rice lands, are the monsoon lands. There is, however, one great differ-

ence between rice and tea. Rice grows with its roots under water in the flat parts of the monsoon regions; tea requires that its roots shall be well drained, and is therefore grown in the hilly parts of the monsoon regions. These warm wet hill-slopes were at one time densely forested, and before man could cultivate tea upon them he had to clear the slopes. He had to modify some of the conditions, so that the conditions under which tea grows are not quite natural. It has become a case of Nature plus Man.

The tea plant is probably a native of India, where it is found wild. When left to itself it attains a height of 30 or 40 feet, but as seen in the tea plantations it is a bushy shrub, kept down by pruning, chiefly for convenience when picking the leaves, to a height of from 5 to 6 feet.

There are many wet hot hillsides in the world where tea *could* be grown, but the following estimate of the annual production of tea (in millions of pounds) shows that only a few of the suitable countries do actually produce this plant:—

1. China	1710	70¼ per cent. of the total.	
2. India	353	14½	,, ,,
3. Ceylon	195	8	,, ,,
4. Java	73	3	,, ,,
5. Japan	70	3	,, ,,
6. Formosa	30	1¼	,, ,,

We are naturally led to wonder what it is that has so definitely settled the cultivation of tea in these countries. We shall arrive at the solution of the question by considering the methods of cultivation and manufacture practised in China, the country that produces the greatest amount of the leaf.

The Chinese farms are mostly small, four to five acres. Great care is taken with the selection of seed, and when the seedlings are 4 or 5 inches high they are transplanted into rows 2 or 3 feet apart. The first crop of leaves is

Fig. 3.—Monsoon Lands: Tea

picked at the end of three years; after that there are three harvests a year. Picking begins about the middle of April and takes away the young leaf buds. These produce the finest kind of tea, and are so highly prized in China that they are practically never exported. The picking of these young buds would cause considerable damage to the tree were it not for the rain and the heat,

which favour rapid growth and allow the plant to withstand such severe usage. The second plucking, which is the most important of all, occurs about the middle of May, and then, as soon as the plants have recovered from this second attack, a third and last picking, about August, produces a very inferior quality.

The gathering of the leaves must be done in a particular way; only the top part of the leaf is required, not the stalks. People are not fond of stalks, and tea containing them is not of great value. Hence the picking must be done neatly, by deft swift fingers. The leaves have to be picked one at a time, and a single pound of the dried leaves contains a vast number of leaves, for much of the fresh leaf, as it is obtained from the tree, is simply water. If we bear in mind the figures given on page 15 we can realise that to gather the huge quantities required to make up those figures, *one leaf at a time*, means an enormous amount of labour.

The picking is, however, only the beginning of the business. The leaves are put into baskets and carried to a drying-shed. A fire is lit in a furnace and the leaves are thrown into shallow iron pans arranged in a row over a flue; the furnace is at one end of the flue and the chimney at the other. The leaves at once begin to crack and become moist with the sap which is forced out of them by the heat. In about five minutes they have lost their crispness and have become soft and pliable. They are next placed on bamboo tables and rolled and kneaded very much as a baker kneads dough for bread. After five or six minutes of this treatment much of the moisture has been squeezed out and the leaves have become twisted. The rolled leaves are now spread thinly

and evenly on a bamboo screen, and exposed to the atmosphere just long enough to expel most of the remaining moisture. This has to be done very gradually in order that the leaves may not lose their softness and elasticity. The soft, pliant, almost completely dried leaves now go back to the iron pans for a slow steady roasting. Care has to be taken that they are neither scorched nor burned, and while one person looks after the fire, others stand in front of the pans and mix and agitate the leaves with their hands so that all shall be equally dried. As the heat increases the leaves become too hot to be mixed by hand, and they are stirred with small bamboo whisks or brushes. In an hour or so they are dry, twisted, and curled, ready for market.

The tea is now picked over and sifted and sorted into different grades. This is all done by hand, and the work requires much skill, rapidity, and experience, in order that the different grades shall really be uniform throughout. Sorting is followed by packing. The tea is put into boxes or baskets and pressed together by treading on it. The feet of the packers are covered with clean shoes made of straw or cloth.

In some grades of tea each single leaf is rolled by human fingers.

It will be seen from the above account that tea, as prepared in China, requires the employment of huge quantities of labour. It is just the same in India and Ceylon, for though in those countries much of the work is now done by machinery, yet the planting, weeding, and picking have all to be done by hand, and in Ceylon alone about 400,000 coolies are employed. In order then that tea can be cultivated at a price which will enable it to be sold to other countries, there

must be an immense supply not only of labour but of *cheap* labour.

The United States of America, for instance, contain an area in the S.E. geographically suitable for tea—wet, warm, hilly—which is one hundred times as big as all the tea plantations of Asia, but no part of America is a tea-growing country, and no American area appears on the list given on page 15. A little has been grown near Charleston, where the picking is done by negro children, but wages are too high to allow the industry to expand. The only countries with the right geographical conditions and, at the same time, with the necessary supplies of cheap labour are those already referred to.

It is worth while inquiring for a moment how it is that there should be this abundance of cheap labour in the monsoon lands. The combination of heat and moisture causes all plant life to be very productive, with the consequence that food is comparatively easily obtained. Men have crowded together, and the crowd has grown to such an extent in the monsoon lands that practically half the entire population of the world lives there. It is such a big crowd that it now requires the most diligent labour to keep it alive. And the result is that not only has the habit of hard unceasing labour become established, giving us perhaps the most industrious people the world knows, but the habit of thrift has been practised also, to such an extent that the people can live and thrive on an amount of nourishment that would be starvation to a white man.

The excess of labour has led the monsoon peoples to develop industries in which that excess can most profitably be employed—that is, in the cultivation of such products as rice, tea, and silk.

III

WATER SUPPLY: ORGANISATION, PAYMENT FOR SERVICES

HUMAN beings, like plants, cannot live without water. Most of us get it so easily from a tap that we give but little thought either to its value in our daily lives, or to the trouble that is taken to make it available at the tap and fit for drinking when we get it.

Human beings, unlike plants, cannot wait a long time for water. Plants can often withstand a prolonged drought; more thirsty man is uncomfortable if he be deprived of moisture for more than a few hours. Water makes up two-thirds of the human body, and this is being continuously given off by the skin, the lungs, and the kidneys. As we lose, altogether, about five pints of water a day, we cannot be healthy unless this is constantly and regularly replaced. We actually need to drink at least three pints a day; the remainder is obtained from our food.

So important is the question of water that the expression 'a well-watered country' used to mean just this, that the supply of water for drinking purposes remained plentiful.

The necessity for a good supply of water is responsible for the position of most of the ancient cities of the world, on the banks of rivers and lakes. And when men settled in places where

there was no water at the surface, then their homes were either near springs or where they could sink wells. Thus there are no towns or villages on the chalk hills of Sussex, for the rain rapidly gets away through the porous rock; but there is a line of villages along the junction of the chalk with a less pervious soil, for there the

Fig. 4.—Chalk Downs

The land over 300 feet and most of the land to the south is of chalk. There are few villages on the chalk, but immediately to the north there is a line of villages

water that has passed through the chalk breaks out in springs.

Water from streams, lakes, and springs was and is, in many parts of the world, still brought to the houses in buckets, a very slow and tiresome business. In the case of wells it has further to be drawn up or pumped up; probably for the last four hundred years the pump has been much more in use than the old wheel-and-axle arrangement with its rope and bucket. Very often one

well supplies several houses; the work and cost of making it has been shared among the people who can use it, because it was cheaper and equally convenient to supply a group of houses with one well rather than to dig one well for each house. We get here a simple illustration of a fact that we shall often have to call attention to later on in far more complex circumstances—the value of *co-operation*.

With the growth of population, and its concentration in cities, dependence upon the natural rain supply of the district becomes impossible. Firstly, not enough rain falls on a city to supply its inhabitants with all that they require for washing, cooking, drinking, and flushing sewers, and for use in the many manufacturing enterprises that are so often connected with city populations. And, secondly, the quality of the water deteriorates. In early times, when the land was sparsely populated, the streamlets that fed the larger rivers were fairly pure. But to-day there are, in some districts, so many people and animals on the land that the river water often becomes impure through the large amount of refuse that finds its way thereto; shallow wells are also poisoned by drainage from the soil, thus rendering the water unfit for human consumption and the source of many serious diseases like scarlet and typhoid fever.

When a town reaches a certain size it is absolutely necessary to go far afield in order to obtain enough water. Two points have to be considered —quality and quantity. We can expect to get most water in the regions where the rainfall is heaviest, and to get the purest water where the number of men and animals is smallest. In the British Isles it has not been difficult to discover

sufficient places where both these conditions are satisfied at the same time. The geography of our islands has been a great help to us in this respect.

The most important winds in the British Isles

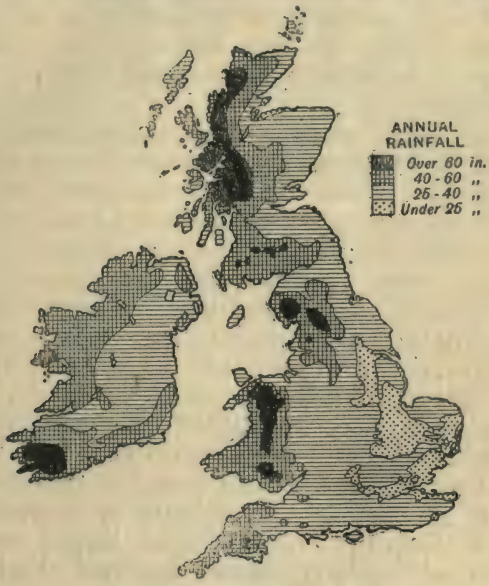

Fig. 5.—British Isles: Rainfall
There is most rain in the west

are those from the west and the south-west, which blow, on an average, two days out of three all the year round. They come to us from long distances over the wide ocean, and they arrive at our shores heavily laden with a plentiful supply of water vapour. But when they reach these shores they come into contact with the masses of high land that are spread along the west coast, from Cape Wrath to Land's End,

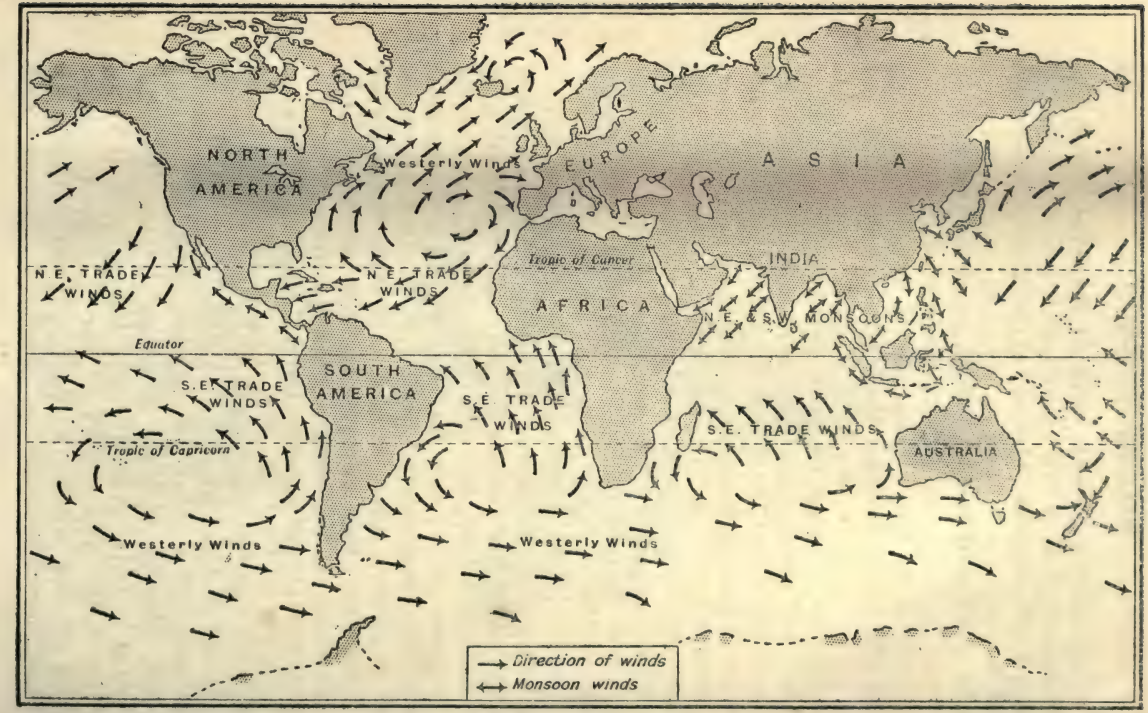

Fig. 6.—World: Winds

This map shows the average directions of winds: it does not mean that winds always blow as shown. Notice (1) two belts of westerly winds, the British Isles being in the northerly belt; (2) the trade winds; (3) the monsoon winds which blow in opposite directions in summer and in winter

with scarcely a break. When the wet air meets the mountains it is compelled to rise. As it rises, the pressure of the atmosphere decreases and the vapour-laden air expands. But expansion can only take place if heat be supplied and, as there is no artificial heat available, the heat necessary for the expansion is taken from the air itself. This means that the vapour-laden air is cooled and, when the cooling has gone far enough, the temperature is so reduced that condensation takes place and rain falls. Therefore the fact that wet west winds blow on to the high west land makes the lonely Highlands of Western Britain a region of heavy rainfall. Here, then, there is a region where the quantity is great; moreover, owing to the fact that few people live there, the surface water is purer than that found elsewhere.

As a rule the reservoir where the water is collected is a lake, either a natural one or one formed by building a dam across the valley, thus impounding the water higher up. In order to prevent contamination of the surface water all the land round the reservoir is fenced or walled off, trespassing is forbidden, houses are destroyed, trees are pulled up, and everything that might possibly contain sources of disease is swept away.

Manchester gets water from Lake Thirlmere in the Lake District. By building a large dam, the first of its kind to be constructed in Great Britain, the level of the lake was raised 40 feet. Here 8,000,000,000 gallons of water can be stored for delivery nearly 100 miles away. Loch Katrine affords a natural reservoir for Glasgow, and Lake Vyrnwy (68 miles away) for Liverpool. The valleys of the Peak District of Derbyshire hold supplies for the use of Sheffield, Derby, and

Nottingham; the Birmingham supply comes from the Elan valley in South Wales. Fig. 8 shows a part of the valley of the Afon Elan, or river Elan,

Fig. 7.—British Isles

Map to show the situations of the chief reservoirs and the towns they supply

with contour lines from 800 to 1250 feet. These show how steep-sided the valley is and how suitable for the erection of a dam to hold the water. It is seen, however, that the water in this valley has been held up not by one dam only but by a

whole series. London gets its water from the Thames and the Lea and their tributaries, and from deep wells in the chalk, but many people think that it will not be so very long before it will be obliged to draw upon some part or other of that 'natural water estate' that exists in the west.

From the reservoir the water is led, perhaps by conduits open to the air, or by pipes, or through tunnels, to a high-level 'service' reservoir near the town. The water next passes to the filter-beds, where it is freed from suspended matter, bacteria, and other things dangerous to health.

Fig. 8.—Elan Valley Waterworks

The filter is usually a tank of concrete or brickwork from six to eight feet deep. The tank is filled with two or three feet of broken stones and gravel, which decrease in size from the bottom upwards and on which rest about two feet of fine sand. The water is supplied slowly and, as it passes downwards through the beds, it leaves behind it most or all of the solid matter; it is this solid matter that harbours the dangerous germs. After some time the upper layers of

sand get clogged and the top half-inch or so is skimmed off.

From the filter the water passes to the clear-water tank, which is usually from ten to twenty feet deep, and built with brick or concrete walls and concrete floor; it often has an arched roof supported on piers. A bank of earth, on the top of the roof, tends to preserve an even temperature. Before the water escapes from the tank it passes through screens of fine-meshed copper gauze.

Fig. 9.—Bradford Waterworks

The outlet pipes lead to the arterial mains laid down under the streets, and are connected with the 'service' mains which are generally of small diameter — six inches or less. From these service pipes, pipes of lead convey the water to the houses, and when the tap is turned,

water is obtainable, pure in quality and plentiful in quantity, which has travelled hundreds of miles, first in moisture-laden air above the ocean, then as rain down the hillsides, and finally as water through many reservoirs, tanks, and pipes.

Even this is not all that must be done in arranging for water supply. In Fig. 9 it will be seen that while some reservoirs are connected with pipe lines to Bradford, others, *e.g.* Gouthwaite, are not so connected. If the map is carefully studied it will be seen that each of the rivers which supply Bradford have some reservoirs connected with the distributing pipes and some not. This is because the people of Bradford are allowed to take water from these rivers only on condition that a certain minimum flow is preserved in them. Reservoirs have to be made not only to supply the city, but to ensure this minimum flow even in dry weather.

This brief outline of the collection and distribution of water is, perhaps, quite sufficient to help us to realise that its supply for use at taps is a very costly process.

The heavy expense incurred in bringing the water from the hills to the cities is borne either by a water company, whose members subscribe the money and share the profits, or by the city, which provides its own supplies and recovers its expenditure by means of a water-rate. In the latter case there is no attempt to make a profit on the enterprise ; the people regard a good supply of pure water as necessary for the health and prosperity of the town.

What we pay for in the case of water is not raw material, but the cost of bringing it to the house. Water is free, and everybody is at liberty to collect it for himself if he wishes so

to do. In the monsoon countries, where rain falls only in the summer, and where waterworks with all their different reservoirs, filters, pipes, and taps are for the most part unknown, this is still the custom. But this is inconvenient and, amongst all civilised communities, it is the custom to entrust the collection, storage, and purification of water to some company or public authority. When we pay the water-rate we pay for *distribution*. As civilisation advances, we have to include, in the cost of providing the necessaries of life, not merely the cost of land and the cost of labour but also the cost of distribution.

Away at the back of all this there are the ever-present geographical conditions. There would be no water to distribute if it were not for the rain; and in this country it would not come from the western area if it were not for the wet western winds and the high western hills. And, yet again, it would not be distributed if man did not consider that, in one way or another, it pays in the long run to spend the huge sums of money that are necessary in order that water should be supplied to our households pure in quality and abundant in quantity.

IV

MILK: THE FARMER: DEMAND AND PRODUCTION

MILK is something more than a drink; it is one of the most important of foods. It is the chief food for infants, but unfortunately it readily absorbs disease germs, so that it needs special attention on the part both of those who produce and those who consume it. So clearly has this been realised that the nation, speaking through Parliament, has passed several laws known as the Infectious Diseases Prevention Acts, which give power to municipal authorities, if they care to use it, to inspect dairies, take samples of milk for examination, inspect milking sheds, and even prevent a farm from supplying any milk at all if danger from that farm is feared.

Some municipalities, like St. Helens in Lancashire and Battersea in London, are their own milk producers. They are careful to keep only clean and healthy cows; they carry the milk in clean vessels and, when it arrives at the town depot, they put it into sealed bottles. By taking all these precautions they guarantee to the consumer a supply of perfectly pure milk.

The supply of milk is dependent first upon natural conditions, then upon the work involved in its production, and, finally, on the organisation

that must be set up for its distribution to the customer.

The natural conditions are quite simple. As milk is obtained chiefly from cows, and cows are fed on grass, an abundance of pasture land is required; that means a fairly good and constant supply of rain. A tree, by reason of the fact that the roots, and especially the fine branches of the roots, spread out over a wide area and often pass deeply into the ground, has, as it were, a big collecting area, whereas the smaller, shallower roots of the grass reach but a comparatively small area. Hence during a hot dry summer a tree may draw water from deep layers of the soil, while grass, dependent as it is on the moisture in the upper layers, would wither. Grass, if it is to remain green throughout the year, requires frequent if gentle showers, especially during the growing seasons of spring and summer.

There is enough rain in England to support forests, and England is, normally, a forest country. This is evidenced in the story told by the names of many places. Thus *Weald* is another name for forest; and we have Ash-*hurst* where hurst means a forest, Brent-*wood*, *Oak*-ham, the ham or dwelling amongst the oaks, *Birk*enhead (birk is birch), and so on. Further, we read of Queen Elizabeth hunting where Oxford Street, London, now stands, and one of the earliest references to Harrow, now a district of meadows, is a charter of Lanfranc, the Norman Archbishop, commanding Geoffrey de Mandeville to 'chase neither stags nor hinds nor fallow deer, nor hunt at all on them, except so far as he [that is, the Archbishop] may order or permit.'

But except here and there, as in the New Forest and Windsor Forest and a few other

survivals from our wooded past, all the forests have disappeared. In earlier times much of the timber was cut down, to be converted into charcoal which was used in the smelting of iron and other ores, to clear the land for purposes of cultivation, and to make way for the extension of towns. Man has always been at war with the forests, for abundance of trees means shortage of food. And as forests are usually gloomy and damp they are unsuitable for human development. Where the forest holds sway, as in the basin of the Congo, the natives are backward and ignorant; where man has conquered the forest he has been able to advance towards a higher form of civilisation.

Another important factor is the winter temperature; if this is low the grass does not grow well at that season, and also the cattle must be kept indoors. If it is a little warmer the grass grows and the cattle may remain in the fields all the year round; thus the expense is lower.

Now, as we have seen in the last chapter, there is most rain in the west, and in winter it is also warmer in the west. One result of this is that there is long grass in the west. The length of the grass is important; cows have big mouths and could not crop the shorter grass that is nibbled by the smaller mouths of the sheep. In Ireland, which is an important cattle-raising country, cows and horses can often be seen standing knee-deep in the pastures, lazily chewing the long rich grass. The cattle areas are those where a fairly constant supply of rain gives rise to heavy crops of long grass. The plains of Cheshire, Staffordshire, Somerset, and Devon are important cattle areas. Ayrshire is called the dairy of Scotland, while cattle are produced all over Ireland. But although the growth of grass

is most plentiful in the west, very many of the people who drink the milk—that is, those who *demand* the milk—live in the east. And 'demand' is a most important factor in trade.

A man might possess a thousand elephants in Cornwall, but nobody in this country, except

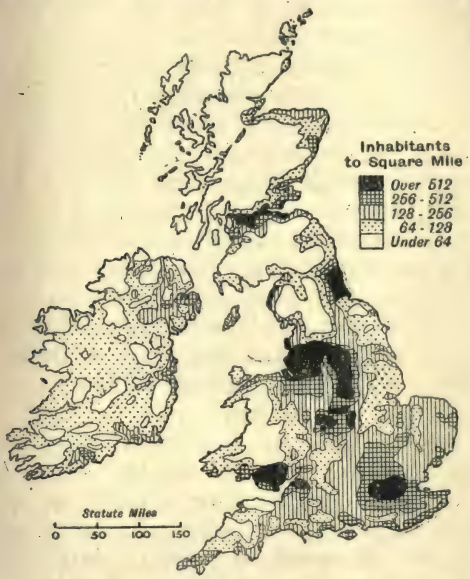

Fig. 10.—British Isles: Population

perhaps circuses and zoos, wants elephants; there is no demand for elephants here, and their value is practically nothing. Few people would even accept the gift of one. On the other hand, a man living near the teak forests in the monsoon region would be a very rich man if he possessed a thousand elephants, for there there is a considerable demand for elephants to work in the forests, hauling and piling the heavy logs of teak.

As the demand for milk is in the east it would really be most convenient if it could be met there. Milk, moreover, cannot stand carriage of much more than two hundred miles under the most favourable circumstances, and how to carry it so far, and keep it sweet at the same time, is

Fig. 11.—British Isles: Cattle
Cattle are mostly in the low land in the west

a matter that has called for much experiment. Chilling the milk within fifteen minutes of milking keeps it from going sour for periods varying from twelve to thirty-six hours. The chilling is carried out by causing the milk to trickle over an arrangement of metal pipes through which ice-cold water is circulating. By this means it has been found possible to bring milk to London from Stafford-

shire, and even over the Channel from France and Holland. In 1910 we received from these two countries no less than 23,578 gallons of milk, and in the same year France sent us over 500 tons of cream. But the consumer will always be wise to purchase milk that has been produced near his home, for though chilling may keep the milk from going sour, it does not kill any disease germs that may be already in the milk. It merely keeps their number from increasing for a time.

Because we can get really fresh milk only when we get it rapidly, it is produced on the lowlands of the east where the natural conditions are not quite suitable as there is less rain. More milk is obtained in the west than can be conveniently transported for consumption in that form, and what is left over is mostly turned into butter, cream, and cheese—Irish butter, Devonshire butter, Cheddar (Somerset) cheese.

Because milk requires rapid transport, the farms where it is obtained must be situated close to a railway station, not more than a few miles away at the most. Therefore the very mountainous parts of the west, and even some of the hilly parts of the east, where the farms are some distance from the railways, are at present not suitable for more than purely local supplies.

The higher parts of the mountains of the west are colder than the lowlands, so that even though they are rainier the grass is shorter. It is the lowlands of the west on which cattle are fed in greatest number. The Highlands of Scotland are rainy, but there are few cattle and very few dairy cattle.

The production of milk is, again, the work of a farmer and the result of work that requires care,

forethought, and much toil—a work, too, that is never finished. As hour follows hour throughout the working day, and month follows month throughout the year, the toil of the dairy farmer continues.

When the milk has been treated it is taken to the station, put in the train, unloaded at some other station, distributed to the dairies, taken round by the milkmen and sold in single pints at our doors. What this means may be gauged by considering the case of London alone. At one time, before the coming of the railways, London kept a great many cows in or near the city. There were, in 1889, 10,000 cows in what is now the county of London; in 1900 there were only about 5000. The following figures give the quantities of milk brought to London by some of the railway companies in a single year:—

Great Western Railway . . .	11,000,000	gallons.
London and North-Western Railway .	9,000,000	„
London and South-Western Railway .	8,000,000	„
Great Northern Railway . .	7,500,000	„
Great Eastern Railway . . .	7,000,000	„
Midland Railway	6,000,000	„

This milk is sent to about 5000 dairies, and to a number of small tradesmen who sell other things besides milk, so that at least 12,000 traders deal in milk, and reckoning in the milkmen who take it on 'the rounds' and others connected with the trade, London employs over 25,000 people in distributing the daily milk supply. The total amount of milk consumed in a year is over 60,000,000 gallons, and to produce this amazing quantity 4300 farmers keep 120,000 cows. If we allow ten cows to one milker, there must be 12,000 people, engaged twice a day, merely milking

the animals. To carry the churns that hold the milk to the stations, it requires 3500 horses, while to distribute the milk in London requires 5700 horses.

A very difficult problem for the farmer is to know just how much to send to town. It is useless to send 1000 gallons to a place where there is a demand for only 500 gallons, or to use more churns than are necessary for the quantity that has to be forwarded. The difficulty arises because the demand is not constant. Any big change in temperature, either towards cold or heat, creates a demand for more milk—hot coffee or tea if it be winter, milk and soda, etc., if it be summer. But the same causes that increase the demand decrease the supply as the cows produce less under such conditions. On the other hand, if the summer temperature falls by about ten degrees, then the cows give an increased supply, but the people are less thirsty and demand less. This means great waste; one firm has had as many as 600 gallons of milk returned in one day.

Owing to the fact that rain costs nothing and produces an abundance of grass, and also to the fact that the railways have made special arrangements for the conveyance of the churns, milk has been, until recent years, very cheap.

The cost of milk includes the cost of production, and a very heavy cost for distribution owing to the distance most milk is carried, and the number of people who have to be paid to distribute it. The cost of production depends on the rent of the land, the quality of the grass, the cost of labour, and the cost of food for the animals. If any one of these rises the consumer must pay more for his milk. The cost of food is a very important item; generally speaking, dairy

cows during the summer feed chiefly upon grass in the meadows, but they get, in addition, cotton-cake, grains, and meal. During the winter they are fed on hay, pulped roots, cake, meal, and grains, and part of the farmer's summer work is the growing of winter food, for use when the cows are no longer allowed to graze in the open air; one of the chief objects of the dairy farmer is to grow heavy crops of those substances which he needs for the winter feeding of his stock.

The cost of milk, as of everything else, depends to some extent on the demand. If more milk is demanded than the farmer can supply he puts up the price, and the people who can afford to pay most get most. If more milk is produced than there is a demand for, the price falls; the farmer may be glad to get rid of it at almost any price it will fetch. If the demand is greater than the supply, so that the price is raised, then places where the natural conditions are not quite suitable will be utilised for the production of milk. But this does not reduce the price, for the cost of production is always greater when the conditions are not naturally suitable.

In order to maintain a cheap and therefore an abundant supply, the dairy farmer tries to keep down the cost of production. He 'improves' his herds by keeping only those that give the most milk and breeding calves from them; he tries to improve his pastures and his crops so that his food supplies cost him less, and he looks to the railways to adopt new and improved forms of transport so as to lessen the cost of distribution. The production of milk is, next to the production of meat, the most important branch of our agricultural industry.

V

BREAD: THE FARMER: CULTIVATION

HOUGH milk is a complete food for infants it is not a complete food for young persons or adults. These forsake, everywhere, and at a very early age, a diet of milk for one of a more varied character. There are races, like the Eskimo, that live entirely on animal food, and there are many people, *vegetarians*, who live entirely on vegetable food. But as a rule men prefer, when they can get it, a mixed diet, partly animal and partly vegetable, and in all civilised countries the chief element of that diet is some form of bread—'the staff of life.' Bread is made of different kinds of grain—barley, rye, and wheat; of these wheat is the chief. It is the most important foodstuff amongst the people of Western Europe and of the temperate parts of America.

Wheat and other grains, such as oats, maize, rice, etc., are the fruits of different kinds of grasses. They are known as cereals—after Ceres, the goddess of agriculture—and they possess two valuable qualities from the point of view of trade: (1) they can, under proper conditions, be stored for long periods, and (2) they can be carried about from place to place without suffering damage. These properties they owe to their structure; they are very hard and have tough protecting skins.

The conditions necessary for good wheat crops are :—

1. A sufficient but not an excessive amount of moisture.
2. A dry summer which is essential for ripening the grain.

Fig. 12.—British Isles: Wheat
Wheat is grown chiefly on the low land of the east

3. Warm weather just before harvest.
4. A fairly stiff soil to support the ear-topped stalk and to retain sufficient moisture.
5. A slight slope, sufficient to provide a natural drainage.

All these conditions are usually to be found in East Anglia, that part of the British Isles which

lies between the Humber and the Thames. This is, in June, the warmest and the driest part of the country, and the summer weather is usually bright and sunny. The soil is a kind of very fertile clay, and the flatness of the land assists all such farming operations as ploughing, sowing, and reaping. In Scotland the lowlands of the east also produce wheat, but not to the same extent as in the east of England, for the farther north we go the lower the summer temperature. Ireland produces much less wheat than either of the other countries because the climate is much too wet and the summer temperature is also too low. Thus in 1914 the areas devoted to wheat in the different countries of the United Kingdom were :—

England and Wales . .	1,807,900 acres.
Scotland	61,000 ,,
Ireland	37,000 ,,

Our bread, like our milk, comes to us as the result of the work of the farmer. Food is more necessary than even clothing or shelter. Therefore agriculture is the most important industry in the world and the farmer the most important workman in the nation. We have seen that the work of the dairy farmer is unceasing. The same is true of the farmer who grows wheat.

The following is the common method of farming a field in Norfolk. First of all a root crop, such as Swedish turnips, is grown in order to give an opportunity for clearing the land of weeds. It also 'produces a large amount of food for sheep and cattle. Parts of the roots are left on the land, where they are eaten by sheep during the winter. The roots alone are not suitable for a complete diet. They are supplemented by hay

and by some kind of concentrated food rich in nitrogen, usually linseed cake, the residue left when the oil is pressed from linseed. And here we must note two facts: (1) Plants require large quantities of nitrogen. (2) The nitrogen has to be supplied by the use of manures containing nitrates, or by growing clover and other similar crops which have, in little swellings on their roots, colonies of bacteria that can manufacture nitrates from the nitrogen of the air. Now an animal retains in its body only about one-tenth of the nitrogen of its diet, so that nine-tenths of the nitrogen of the roots, hay, and cake consumed by the sheep find their way back to the land. This practice of feeding sheep on the land therefore acts practically as a liberal nitrogenous manuring. The trampling of the soil in a wet condition in the winter also packs its particles closely together and increases its water-holding power. The rest of the roots are carted to the homestead for feeding cattle, usually fattening cattle for beef. Again, the roots are supplemented by hay, straw, and cake of some kind rich in nitrogen. The straw from former crops is used for litter. Its tubular structure enables it to soak up the excreta of the animals, so that the farmyard manure thus produced retains a large proportion of the nitrogen and other substances of manurial value, which the animals fail to retain in their bodies. This farmyard manure is kept for future use, as will be seen later.

'As soon as the sheep have finished eating their share of the turnips they are sold for mutton. It is now too late in the season to sow wheat. The land is ploughed, but the ploughing is only a shallow one, so that the water stored in the deeper layers of the soil which may have been

solidified by the trampling of the sheep may not be disturbed. The surface soil turned up by the plough is pulverised by harrowing until a fine seed-bed is obtained, and barley is sown early in the spring. Clover and grass seeds are sown amongst the barley, so that they may take firm root whilst the barley is growing and ripening. The barley is harvested in the autumn. The young clover and grasses establish themselves during the autumn and produce a crop of hay the following summer. This is harvested towards the end of June, and the aftermath forms excellent autumn grazing for the sheep and cattle which are to be fed the next winter.

'As soon as the harvest is over the farmer hopes for rain to soften the old clover land, or *olland* as it is called in Norfolk, so that he can plough it for wheat-sowing. Whilst he is waiting for rain he takes advantage of the solidity of the soil, produced by the trampling of the stock, to cart on to the olland the farmyard manure produced during the cattle-feeding of the last winter. As soon as the rain comes this is ploughed in, and the seed-bed for the wheat prepared as quickly as possible. Wheat should be sown as soon as may be after the end of September, so that the young plant may come up and establish itself, while the soil is yet warm from the summer sun, and before the winter frost sets in. The wheat spends the winter in root development and does not make much show above the ground until the spring.' [1]

The above account refers to autumn-sown wheat and only to the county of Norfolk, but it is typical of wheat-farming in Britain and it serves to show what a complicated business

[1] *The Story of a Loaf of Bread*, Wood.

farming really is. Other kinds of wheat are spring-sown. In their case the land is ploughed in the autumn and left in big lumps, so that as much as possible is exposed to the air. During the winter the water between the particles of the soil freezes and expands, and so forces the particles farther away from each other just as when water freezes in the pipes and bursts them. This produces a fine tilth and, in the spring, the land is harrowed and the seed sown. It will be noticed that all these operations take a great deal of *time* and that other crops, besides wheat, have to be attended to, for it is not profitable to grow the same crop on the same ground year after year. Then there are the cattle to be looked after, both for their value as food and for the value of the manure they produce. Any farmer must think at any rate a year ahead, but the Norfolk wheat farmer who works the four-course rotation must think four years ahead. Growing wheat is not by any means a simple job.

When the harvest is ripe it must be reaped. At one time this was done by means of a sickle; the sickle is still in use in Ireland and in the north of Scotland. A good workman, labouring hard from early morning until the evening, cannot cut an acre a day. At the present time machines are used that cut and, at the same time, bind the corn into sheaves. After harvesting comes threshing, to separate the grain from the husk, and winnowing and dressing to remove all the chaff, weed-seeds, and dirt, and only then is the wheat ready to be taken to market to be sold.

And here we must pause for a moment to explain how markets came into being. Trade began when one person exchanged something of which he had too much for something of which

he had not enough. Such exchanges are almost as old as the human race itself, but the more civilised man becomes the more he demands and the more he is in a position to supply. Early trade was a mere matter of barter—the exchange of one article for another, a cow for an axe, a sheep for a strip of cloth, and so on. This method is unsatisfactory because a man may not always be able to carry out an exchange. One person might want to barter a cow for a few sheep, but there might be no one who wanted the cow or nobody who had sheep to dispose of. With the introduction of money, trading became easier, for the money given in exchange for the cow at one place could be taken away to purchase the desired sheep at some other place.

The earliest money was not copper or silver but a kind of 'token,' a reminder of the promise of the buyer to give certain goods at a later date. For instance, the token might be a rough image of a cow cut in leather, to show that the buyer promised to pay with a cow, later on, for the sheep or other articles he had received. But tokens could be so easily forged that men wanted something in exchange for their cows and sheep which was itself equal in value to that of the possessions with which they had parted, but which could be carried about as the token had been. Amongst the Eskimos this took the form of skins and blankets, amongst the Khirgiz lumps of butter, cubes of salt, and bricks made of tea, while in certain parts of Africa, cowrie-shells, **T**-shaped pieces of iron, and axeheads were used.

This method of carrying out exchanges was less inconvenient than mere barter, but it was not particularly convenient, as blankets, axeheads, and the like are themselves cumbersome. The

next step was to use something small and easily handled but of considerable value, and so we arrive at the use of metal, at first in blocks or slabs without date or other mark, but finally in the form of coins such as those with which we are all more or less familiar.

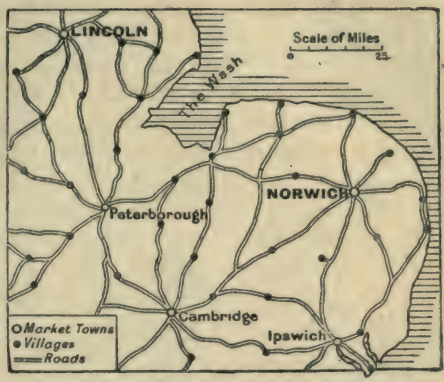

Fig. 13.—Towns of East Anglia

The desire to barter led men to meet at certain definite spots at more or less regular intervals. The most convenient places were where most roads from longest distances most easily met. Such places are found at cross-roads, at the gaps in hills, where land and water roads meet as at the junction of two rivers, or in the centre of a plain.

Fig. 13 shows market towns in East Anglia with the roads to them, while in Fig. 14 are shown the roads converging to the bridges at Maidstone, Canterbury, and Ashford. It will be noticed how the roads tend to avoid the high ground of the North Downs and to use the valleys.

At first the market was just a meeting place and nothing else; there were no houses, shops, or inns. But after a time refreshment booths such as are still found on African caravan routes were set up, and these in their turn were followed by the true 'public house' where refreshments, both solid and liquid, were provided for man and beast. Round the same spot, blacksmiths,

cobblers, saddlers, tanners and wheelwrights, and others who were useful in connection with transport built workshops; and we get the beginnings of a town. 'In the days when written receipts were impossible, no bargain was valid unless made in the presence of "reputable" witnesses. Such witnesses could most conveniently be found at the cross-roads, and here is another reason

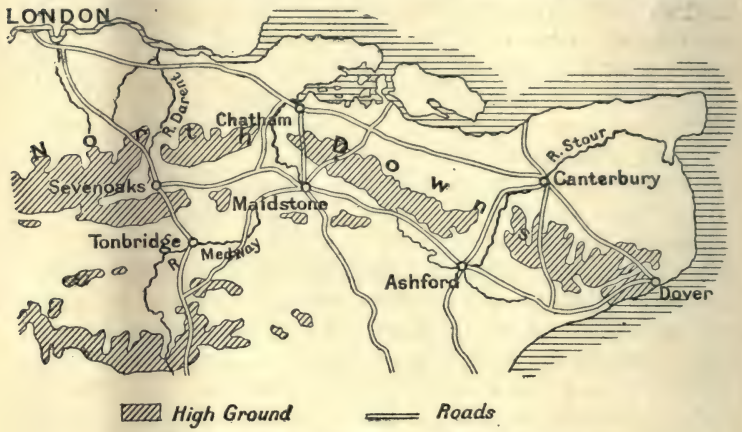

Fig. 14.—Market Towns, South-East England

for the site of the market. The market at Leeds was formerly held on the Bridge—also a likely place of resort—and the street to which it was afterwards removed is still called Briggate.' In many old towns one can tell from the name of a street that a market had been held there though there is a market no longer. In Newcastle there is a street called Bigg Market, 'bigg' being the old name for barley. 'A boundary stone was also a favourite place. The triangular spots at the meeting of the roads are the first cradle of that giant commerce whom we now see with his

seven-leagued boots—ships and railways—striding across oceans and continents.'

Many of the towns in this country have been market towns. They are hundreds of years old, and not so very much changed, in many respects,

Fig. 15.—Plan of Centre of Oxford

Notice that the Cornmarket and Market Street are just beside Carfax or *quatuor furcae,* the 'four ways' or cross-roads. St. Giles was the wool market

from what they were years and years ago. There is a post office, railway station, and official buildings, of which our ancestors knew nothing, but the old church, perhaps as much as eight hundred years old, still retains its position, and the market square still occupies a site where a less civilised people conducted their commerce. As of old time there are regular market days when the

square is alive with people and animals, the shops crowded with country people buying, the air filled with human laughter and gossip, the bleating and bellowing of flocks and herds.

To some such market town the farmer takes

Fig. 16.—Plan of Centre of Newcastle
Notice the old markets in front of the Cathedral with the Town Hall between them. The Castle from which the town takes its name still remains at the bridge-head

samples of his wheat. These samples he shows to one buyer after another, until finally he sells his harvest to the man who will give him the biggest price. The wheat is then sent in bags to the miller, to be mixed with other kinds of wheat and ground into flour. The mills may be driven by wind, water, or steam. The sacks are hoisted to the top of the mill and there emptied. At

the proper time the wheat passes down a shoot and finds its way between two grindstones, of which the lower one is fixed while the upper one revolves. The grinding separates the husk from the wheat, and then sifters separate the bran from the flour and send them down different shoots, where they are once more placed in sacks.

The flour goes to the baker, who puts it in a trough, pours water on it and adds yeast and salt. The dough is kneaded and the bread swells. It is left for a while, after which more flour and water are added, and then the dough is kept for an hour or two till it has 'risen' and become light and spongy in texture. This dough is cut up into pieces, weighed, moulded into the proper shapes, put into an oven and baked. When the bread is cool it is ready for sale and, before long, it may have been delivered at our doors by a motor-driven van, ready for that attention which we never fail to give it, so far as appetite is concerned, though we very rarely regard it as what it is, the last link in a long chain that has taken many hands to fashion and many months in the fashioning.

We have pointed out that when wheat from any market reaches the miller it is 'mixed with other kinds of wheat' before it is ground into flour. There are many varieties of wheat, differing from each other according to the soil, the climate, and the seed from which they are grown. Some kinds produce a heavy crop, but the grains are soft and do not bake well alone; other kinds are dry and hard, but the crops are not so heavy. In England we get a bigger return per acre than is obtained in Canada, but the wheat is not so suitable for making bread. The problem for the farmer is to see if he can produce, at the same time,

both quantity and quality. If he can 'improve' his wheat in such a way that it is specially suited to the conditions under which it grows, and at the same time give exactly the kind of grain that he wishes, then he can hope to reduce the cost and yet make a bigger profit for himself. He helps both himself and the consumer.

It would take too much of our space to explain here how new kinds of wheat are obtained. An interesting description of several processes is given in the book from which we have already quoted the description of wheat-farming in Norfolk. But it is interesting to point out that the Plant-breeding Station at Cambridge University, where experiments are conducted in the production of wheat, has recently introduced two fresh varieties—Yeoman and Fenman—which give a big yield like the wheat formerly grown in England and a quality as good as that of the wheat grown in Canada. The average yield of the ordinary wheat in England is about 33 bushels per acre; the new wheats yielded 96 bushels per acre! And it is claimed that Yeoman wheat does not require mixing with any other wheat, in order to produce a flour that will give the light, white bread of which the English household is so fond. Our scientific men are not merely making three grains grow where one grew before, but they are growing better wheat.

VI

FISH: THE SEAMAN: THE HARVEST OF THE SEA

HILE most of our food is derived from the land, it is important not to forget the harvest of the sea, a much bigger harvest than most people realise. For instance, the ordinary meat supply of the United Kingdom is roughly

2,500,000 tons.

The total average quantity of fish (not counting shellfish) brought to us annually by British fishing vessels in the years 1909-1913 was

1,165,000 tons.

Of this we ate between 600,000 and 800,000 tons and exported the rest, partly fresh but mostly cured.

The annual value of the fish landed in the British Isles in 1914 was:—

England and Wales . . .	£7,846,687.
Scotland	2,971,216.
Ireland	238,635.

And at least £200,000,000 was invested in the fish trade, in the form of boats, lines, nets, barrels and boxes, and other gear. It is difficult for

us to realise what such figures mean, and it is not perhaps any easier to understand what is meant by the fact that our people, before the War, ate 2,400,000,000 fish meals in a year. Perhaps the simplest way of bringing home the value of our sea harvest is to say that in 1913, on the average, one meal in twenty of every inhabitant of Britain was a fish meal. And it is no exaggeration to state that if there were sufficient men, nets and boats, and enough ways of carrying to the towns what was landed in the harbours, the whole of the population in these islands could be fed on fish to-morrow.

The harvest of the sea is reaped, though it is not sown, and the reapers are the fishermen. Their work is hard and dangerous and demands grit and self-reliance. Sudden dangers have to be met and faced without fear or panic, and this means calmness, strength, and independence. The fishermen share with the yeoman farmers of England, the shepherds of Wales, the crofters of Scotland, the ' sea dogs ' of Elizabeth, a courage, an unselfishness, and a kindliness of character that are amongst the greatest of our national possessions.

Sea fish are divided into two classes, *bottom* fish and *surface* fish. The ' surface ' fish include herring, mackerel, sprats, pilchards, and salmon ; all the rest are ' bottom ' fish. The surface fish are caught by drifters with drift nets ; the bottom fish are caught by trawlers with trawling nets.

Bottom fishing depends on the fact that the seas round Britain are shallow. For a certain distance from any shore there is shallow water ; the land beneath it is called the Continental Shelf. Usually no part of the shelf is deeper than 600 feet. It varies in width, being narrow where

the shores are steep and broad where they are shallow. In the north-west of Europe it is of great width and the British Isles stand on it. The shallowest part of the North Sea, the Dogger Bank, is so near the surface that if St. Paul's Cathedral were placed upon it the whole of the

Fig. 17.—The Lowland and Continental Shelf of North-West Europe

dome would be out of the water. The lowlands of East Anglia where the wheat is grown, and the Dogger Bank, are parts of one and the same plain; one portion of it is above water, the other is below.

Just as the animals of the land consume grass and other plants, so also the fish have their

pastures. There are, in the sea, vast quantities of small plants and small animals which, between them, provide food for the smaller fishes. Even what we regard as clear water contains countless millions of minute plants which are eaten by many small animal organisms. These in turn are eaten by each other and by the fish, but all the animal life of the sea is dependent on an abundance of vegetation, and fish have been called 'the cattle of the ocean.'

The shallowness of the seas is of great importance in connection with the supply of food for fish. In the deepest depths of the ocean, where there is little light, there is little life. It is only in shallow waters that there is sufficient light to permit that abundant growth of tiny plants which is necessary to support the millions of inhabitants of the ocean. Then, too, the shallowness of the seas round the British Isles is of great importance in the actual catching of bottom fish, for if the water were of enormous depth it would not be easy, might in fact be impossible, to drag the trawl in the manner presently to be described.

The chief kinds of bottom fish are shown in the following table which gives the number of tons of each landed in 1913:—

Cod	148,000 tons.
Haddock	112,000 ,,
Plaice	37,000 ,,
Whiting	33,000 ,,
Hake	32,000 ,,

In addition there are halibut, dabs, bream, soles, turbot, brill, and many more which are less well known.

Bottom fish, as the name indicates, live at the

bottom of the sea, and are caught in a net shaped like a bag, which is dragged along by trawlers. The lower part of the net disturbs the fish and causes them to rise, when they are caught by the upper part of the net and forced into the interior. The trawl moves slowly forward at about two miles an hour and the fish are gradually collected towards the narrow end. All escape is impossible owing to a flap at a short distance from the mouth of the net, which is so arranged that it will let the fish in but not out.

When the skipper of the trawler thinks that his net is possibly full enough, it is hauled up by winches, swung over the side of the ship, unfastened, and the whole mass of hake, halibut, plaice, etc., tumbled out on the deck. As soon as the trawl has been 'shot' again, the crew set to work to clean the fish and then to pack them in the hold between layers of ice, three inches of ice to nine inches of fish. At the end of several days the ship puts into port to unload.

At times the trawlers work in fleets, and remain upon their fishing ground for six and eight weeks at a time. The catch is then packed in boxes, and sent off to port at once, by means of steam carrier vessels.

Haddock and cod are caught by line. The lines may be as long as nine miles and have attached to them as many as 5000 hooks, the bait upon which may be worth £10. One end of the line is thrown overboard and sunk at a spot marked by a buoy and a flag. The steam 'liner' then moves off till all the line has been paid out, when the position of the other end is marked by another buoy and flag. In about half an hour or an hour the line is hauled in and the fish taken from the hooks. A steamer has been

known to catch £1000 worth of fish in this way in about a fortnight.

Surface fishing depends on the fact that fish, especially herring (and herring make up half the annual catch), come in from the open ocean to

Fig. 18.—Fishing Towns of North-West Europe

lay their eggs, in myriads, near the shore. In 1913 the landings of surface fish in tons were:—

Herring	.	.	.	611,000 tons.
Mackerel	.	.	.	28,000 ,,
Sprats	.	.	.	4,200 ,,
Pilchards	.	.	.	2,500 ,,
Salmon	.	.	.	2,500 ,,

The figures, except for herring, do not look so very large, but they become much more impressive when we realise that one ton of fish will feed 3000 people. Surface fish swim on or near the

surface, often in great shoals containing millions. They are caught by drift nets drawn through the water by drifters; some of these drifters are sailing vessels, others steam vessels. The steam-drifters of the present day are handsome well-engined vessels, and can attain a speed of nine or ten knots an hour.

The net is let down into the sea and is kept upright by heavy weights at the bottom and big corks at the top. When the net has been lowered the boat is allowed to drift. When the fish swim into the net they try to get through and are caught, by their gills, in the meshes. This is the chief kind of fishing centred at Yarmouth and Lowestoft.

As we have already pointed out, the herring catch is almost equal to that of all the other fish put together, and the herring fishery is therefore worthy of a special line or two to itself. At one time it was believed that the herring had its home in the cold waters of the north, but that at certain seasons of the year it came to warmer climes as if obeying some call of Nature. It is now known that the home of the herring is in the North Sea and the Atlantic, and not far from the coast. It was also believed that the shoals passed from north to south visiting, in turn, the various parts of the coast from the north of Scotland to Yarmouth. This is also not true. They come from the open sea to the shore, in straight lines, to those spots on the coast where it is suitable for them to spawn.

Herrings are caught in enormous numbers; 40,000,000 have been put ashore at Lowestoft in one day. With our present railway arrangements it is impossible to transport anything like this number in time to be eaten fresh. They are therefore cured by being salted or smoked and

dried; they will then keep for either home or foreign consumption. The work of curing is usually undertaken by the Scottish 'herrin'-lassies,' who say that they *follow* the herrings from north to south. What they really do is to *meet* the herrings coming, as explained, from the open ocean. The girls hail from the Outer Hebrides, Skye, the Orkneys and Shetlands, along the shores of the Moray Firth, from Peterhead and Stonehaven to the 'golden fringe of Fife.'

The girls clean the fish, divide them into different grades, and pack them in barrels with salt. They are exceedingly quick and skilful in their movements and they earn quite 'good money.' The herring season extends from June to December, and during those months our east coast is visited not only by British but by Dutch, German, French, and Belgian fishermen. There is a much less important winter or spring fishery off Ayrshire, in the Firth of Forth, and in the Moray Firth.

It must be fairly evident that to handle such a perishable article as fish, especially when landed in such large quantities, there should be a large organisation ready.

The first thing, once the fish is landed, is to sell it. It must go to market, like the wheat. But because of the perishable nature of the article to be sold, the market had, in earlier days, to be as close as possible to the sea. Hence most fishing ports, which are often also fish markets, are as far out to sea as possible, due regard being paid to the necessity for harbours for sheltering the fishing craft. But organisation has made such a difference that the biggest fish market of all is Billingsgate in London. The use of steam on the vessels to give them speed, the use of ice

in the preservation of the fish, and the huge population, not only in London but connected by rail with London by a series of radiating railway lines from the capital, has so centred the fish trade in London that many a fishmonger in a seaside town gets his supplies not from the waters at his doors but by rail from London.

Not all the fish sold at Billingsgate comes direct by steamer. Much of it is brought from other ports, by rail, to be sold in the big central fish market of the kingdom, where it is known that there will always be people waiting to buy. It is put into special fish vans, and carried by special trains to which all other kinds of trains give way. The railway companies have helped to centre the trade in Billingsgate by providing these special vans and trains to bring the fish rapidly from the ports. On the other hand, the Great Central Railway has helped to convert Grimsby into a fishing port of the first importance by connecting it with the central market. In 1854, when the market was local—that is, when the fish was sold where it was landed—Grimsby received

453 tons of fish.

In 1900, when the railway was ready to take it rapidly to London, Grimsby received

165,000 tons of fish.

The Great Eastern Railway has made a fine harbour at Lowestoft and given it a service of fast fish trains. At Milford Haven the Great Western Railway has provided a quay at which fish can be landed at all states of the tide, and so have raised the town to an important position in the list of deep-sea fishing stations.

One might have thought that the cost of the vessels, machinery and nets, the cost of railway vans, transport, and distribution amongst fishmongers and consumers would have made fish a rather dear food. And yet that is not so, for fish, like water, cost nothing in themselves. They are free to any one who cares to go to get them. And the cost of fish, like the cost of water, is the cost of collection and distribution. The cost of collection includes purchase of ships and tackle and the labour of the fishermen, and is mainly the latter.

'While we are discussing the question of distribution, a word must be said about the fried-fish shops. They are among the greatest distributors of fish in the United Kingdom, and they provide meals for a very large proportion of the industrial population. It is reckoned that at the outbreak of the War there were about 25,000 fried-fish shops in Great Britain and that they cooked and distributed about 4000 tons of fish with 10,000 tons of potatoes every week.'[1]

A herring seems a simple thing as it lies upon a plate ready to be eaten, and yet it represents an industry that employs hundreds of boats, thousands of fishermen, retailers, boat repairers, fish curers, fish canners and the people who manufacture the ice, engineers, box and barrel makers, auctioneers, railway porters, engine drivers and railway officials. Two things must strike us: (1) What a host of people have to be set in motion and paid wages before we get a single herring; and (2) What a marvel it is that a herring can be so cheap.

[1] *British Fishermen and the Nation*, Part I.: 'Sea Fisheries.' Reconstruction Pamphlets, No. 29.

VII

YOUR COAT: INDUSTRY: THE OPERATIVE

HE previous chapters show that in order that we may obtain the most simple of meals a great organisation must be set up. And if we closely consider any article of clothing, from our hats down to our boots, it will be seen that we are clad as we are fed, by countless hosts of men and women working in co-operation. These great organisations upon which we now depend so much, and without which the majority of us would be practically helpless, are, nevertheless, comparatively modern. If we go back a few centuries and look at the conditions under which our forefathers lived, we shall find that the cottager was practically independent of other people both for his food and his clothing. And the further back in time we go the truer this becomes.

The villager, in very early days, before the coming of the towns, fetched the household water in buckets from the nearest stream, milked his own cow, grew his own grain, ground it with his quern or, at the most, had it ground at the common mill of the village by the miller—a very important man. He reared his own sheep; his wife spun their wool into yarn and wove it into cloth, or perhaps the yarn might have been woven by the

weaver, who at one stage of our history was another very important man in the village. And even to-day the crofter or small farmer in the remote parts of western Scotland builds his own hut with stone from the hillsides, thatches it with rushes from the moors, cuts peat for fuel from the bog, and eats butter, eggs, potatoes, and oatmeal which he provides for himself. Before he sells his sheep he often cuts off the wool and hands it over to his wife to spin into yarn, weave into cloth, and make into clothes. There are also many other parts of the world where life is lived in this simple fashion. Under such conditions people have to make the most of what they can find near at hand or produce for themselves; as to other things—well, they just have to do without.

Nowadays it seems a very simple and easy matter to go to a shop to purchase a dress or a suit of clothes, but it is only simple and easy for the buyer because other people have been co-operating to produce the dress and suit that are required. The business of getting dresses and suits is, in fact, far more complicated than it was in those ancient times when the simple household of every peasant contained, at one and the same time, the wool-grower, the spinner, the weaver, and the tailor.

Let us try to follow briefly the history of a suit from the sheep to the shop. There are still the four great processes, the growing of the wool, spinning it into yarn, weaving it into cloth, and making cloth into clothes. The breeding of sheep is the work of the farmer. But of this we shall only say that it requires a great deal of skill and patience. We shall begin where the sheep are ready to be shorn.

About the beginning of summer the sheep are washed, either by the old-fashioned method of driving the animals one by one into a stream of running water and cleansing them by hand, or else by means of some kind of sheep-washing appliance. As soon as the coat is well dried, sheep-shearing follows. For many centuries this was always done by hand, with short clippers or shears. Now, however, the immense demand for wool has led to the invention of mechanical cutters which do the work much more quickly and effectively. When the fleece has been removed from the sheep it is rolled up and carefully put away. When the whole of the flock has been sheared the fleeces are sold to a wool merchant, or *wool-stapler* as he is called.

The next operation is *sorting*. All parts of the fleece are not of equal value. The most valuable wool is that which grows on the breast; the least valuable is that near the tail. A pound of wool from the breast will produce 14 miles of yarn; a pound of wool from the tail will produce only about $7\frac{3}{4}$ miles of yarn. The wool at this stage is dirty and greasy. In order to cleanse it it is boiled with soap in great vessels. It is then squeezed between rollers to get rid of much of the water. It passes to the drying machine, where it is exposed to blasts of hot or cold air as required and every particle of moisture is driven out. By means of another machine the locks are disentangled, a blast of air from a mechanical fan blows out the dust, and the wool is obtained in a beautifully flocculent state. By this time it is hard and brittle and, to render it once more flexible and easy to work, it is treated with some vegetable oil such as olive oil. At this stage the fibres are matted together, like

one's hair after washing and drying, and they must be combed out straight by a *combing* machine; the result is a variety of yarn which is too thick and, at the same time, not strong enough for the spinner. In order to render it suitable for spinning it goes through various *drawing* and *roving* machines and is finally, by means of a *spinning* machine, converted into yarn for the weaver. The details of all these machines are too complicated and technical to be dealt with here; their combined effort increases the rate at which spinning can be accomplished by the old-fashioned spinning wheel and produces more uniform kinds of thread. A modern spinning machine can do as much work as was previously accomplished by two thousand people working by hand.

The sheds in which the spinning machines are housed are long and narrow. Thousands of whirling wheels and whizzing spindles fill the air with noise and a sense of uncanny motion. Most of the spinners are women; they are occupied chiefly in watching the spindles on which the threads are wound and in mending broken threads. As the spindles revolve from five to six thousand times a minute, and each girl has to keep watch over scores of spindles, the work requires both nimble fingers and very close attention. With the production of the yarn ends the second great set of processes. The third is concerned with the production of cloth.

When the yarn has been prepared, it is sent to the weavers to be made up into cloth. *Weaving* consists in interlocking two sets of threads crosswise, and is shown in its simplest form in the darning of a stocking, where we first make a set of parallel threads and then pass another set across them, over the first, under the second,

over the third, under the fourth, and so on. In a modern weaving loom the first set of parallel threads, the *warp*, often contains several hundreds. An ingenious contrivance raises or lowers the alternate threads of the warp and throws a shuttle carrying the cross threads or *weft* rapidly backwards and forwards. As fast as the cloth is woven it is wound upon one roller and fresh lengths of warp are unwound from another.

There is much more noise in a weaving shed than there is in a spinning shed. Many of the workers are women, their special business being to watch the flying shuttles as they carry the weft to and fro across the warp and to mend any threads that may break. The work of weaving is done, almost entirely, mechanically by the machines; a modern weaver's work is largely watching and putting in fresh supplies of warp. On some looms the shuttles are supplied automatically as required, and by a clever and delicate device the whole apparatus stops as soon as a thread breaks.

When the cloth has been woven it is *scoured* to get rid of grease and dirt, *stretched* on rails or hooks to be dried, and *burled*, *i.e.* has all its irregular threads and knots removed. It is *mulled* or *fulled*, *i.e.* beaten to interlock the fibres and prevent unravelling, *teased* with teazles (the seed vessel of a kind of thistle) to raise the surface and form a nap, *sheared* to cut off the loose fibres and give the cloth a smooth surface, *finished* by removing blemishes and carefully brushing, and *pressed* between polished boards under great pressure.

We have spoken as if all wool were alike and all woollen goods manufactured from it were manufactured in the same way. But that is

far from being the case. Different breeds of sheep produce different varieties of wool, and, as already pointed out, the wool from one part of the fleece differs from that in another part of the fleece. The wool fibres vary in length and in degree of fineness. The fibres from the Leicestershire sheep, for instance, are much longer than those from the Southdown sheep. As each fibre is called a *staple*, we speak of these wools as respectively long and short staple. If a single fibre be examined under the microscope it is found to be covered with scales which overlap each other; some varieties possess far more scales than others and are used for making different varieties of fabric. But all the fabrics made from wool are divided into two big classes—woollens and worsteds. Woollen cloths are matted or felted and covered with a nap which usually prevents one seeing the interlocking of the warp and the weft. Worsted cloths, on the other hand, have a finer and more open surface and it is possible to see the woven threads.

The two chief manufacturing processes, spinning and weaving, remain essentially the same as they have always been, though differently carried out. The machine simply does more quickly what the human hand performed some centuries ago, but it performs the two main processes in substantially the same way. On the other hand, the machinery has become so specialised, and the workers have in consequence also become so specialised, that the two processes of spinning and weaving are carried out by entirely different sets of people, in entirely different buildings. In fact, so far has the division of labour been carried that it is not uncommon to find one locality devoted almost entirely to one of the

processes. And, further, as there is a very great variety of fabric and every variety requires a special form of machinery, the woollen manufacturer generally prefers to make only one or perhaps two varieties. Similarly, the differences in the fibres from different breeds of sheep lead to specialisation in spinning, with the consequent production of only one kind of yarn in one factory or place. Thus we get:—

Alpaca . .	Bradford.
Carpets . .	Halifax, Axminster, Kidderminster.
Flannel . .	Newtown.
Shoddy . .	Batley, Dewsbury.
Woollen hosiery	Nottingham, Leicester.
Broadcloth .	Frome, Trowbridge.

Amongst the early English, sheep and cattle rearing were important occupations. The wool from the sheep was woven into a coarse kind of cloth at home and not in factories.

As long as the cloth was made at home it could be made in any part of the country, and the manufacture was scattered about everywhere, though here and there in a few places more cloth was made than in others. But with the invention of expensive machinery that required a big house or factory to hold it, the manufacture began to be centralised at those places where power for driving the machinery could be obtained. At first this power was water, and water-mills were set up by the sides of the streams that descended from the hills where the sheep were reared. When steam-driven machinery came into use the most suitable place for the factory was a coal-field. And as the coal-fields were, in most instances, near the sheep pastures there was no great migration from one spot to another. A factory could employ many people; they lived near it to be near their

work, and so we got thousands of people living in the same district and doing very much the same kind of work. The manufacture of wool ceased entirely to be a home occupation and became an *industry*, occupying the whole working time of large parts of the population.

Fig. 19.—Map to show where there are most Sheep

Sheep are chiefly bred where it is dry underfoot: (1) on steep hillsides, (2) on chalk downs, (3) on dry lowlands

Generally speaking, the sheep-rearing districts are on the eastern or drier sides of the hills, and on lowlands where there is little rain and the slope is sufficient to prevent the growth of a marsh. Here there is less chance of the sheep suffering from foot-rot through excessive dampness of the ground. The manufacturing areas are near the districts where sheep are reared, at Trowbridge and Frome near the Cotswold Hills; Galashiels, Hawick, and other places on the eastern side of the Southern Uplands, and, above all, in the West Riding of Yorkshire, on the eastern side of the Pennine moorlands. In the latter district are Bradford, Leeds, Huddersfield, Halifax, and many other busy industrial hives.

The heavy work of the factory is done by machinery—that is, by coal power. It is coal that brings the fleeces to the factories from the ends of the earth, that spins and weaves them into the many varieties of fabric that the fancy of man has invented, and that finally carries the finished product to the markets of the world.

The 'operative'—the person working in the factory—spends the greater part of his time in watching machinery and seeing that it performs its work properly. In some ways he leads a more comfortable life than either farm-hand or fisherman, for he has regular hours and higher wages. He knows at what hour he must begin the labours of the day, at what hour he may cease, and exactly how much time he will be allowed for dinner. He is not exposed to drenching rain and biting winter winds. He thinks, not some years ahead like the Norfolk wheat farmer, or a year ahead like the Scottish crofter, but only about a week ahead, from one wage-day to the next. The others must work, very often, not when they wish but when Nature dictates, and her commands are often both severe and irregular. It may seem, perhaps, that with his shorter and more regular hours and his higher rates of pay the factory operative leads an existence which is to be envied by those who reap the harvests of the field or of the deep. But we doubt it. The factory hand works in a close atmosphere in a gloomy-looking kind of barracks; outside, the air he breathes is foul with smoke. For the green of the field and the blue of the ocean he has exchanged the drab dreariness of warehouse and factory wall. For the sound of the singing birds and the splash of the breaking waves he has the whirl of wheels and the clanging of heavy

machinery, and for the breath of rose and the salt odour of the shore, the tainted scent of oil and grease. And there is, in particular, one condition of life in many of these industrial centres that is very much to be deplored. During the day-time the women, and the children of both sexes, are employed in the mill. When they return in the evening their fathers and brothers are just setting out for the toil of the night. The consequence is that family life is broken up, and it is only during the week-ends that the different members of the same family can be completely reunited.

The cloth has not yet become a suit; it passes to the tailor who, assisted by yet another batch of workers who cut and sew and fashion, turns it into various garments. As a rule, the tailor's occupation is not carried on on the factory system, and, in the country in particular, he is a rather solitary individual who works for himself or for a master who gives him the garments to make up at home. In many towns, however, there are numerous factories where sewing machines are worked by steam and a great deal of strain is removed from the machinist. The more expensive clothes are 'made to measure,' the customer getting a suit that is specially cut and made up for him. The expense is in the wages paid for highly-skilled labour and for the length of time taken to make a suit in this way. The cheaper suits are 'ready made.' Here fifty suits at a time can be cut out by a machine and time is economised. And, as in all cases where things are done in bulk, the saving of time means that the cost of production is much decreased.

The cottager who depended on himself had to grow his own food, build and repair his own

dwelling, and make his own clothes; he spent the whole of his working hours in incessant arduous toil. There was for him no such thing as leisure and he did not expect it. Nowadays the co-operation of a large number of people to produce the things he needs, and to produce them rapidly, and therefore cheaply, by machinery, sets him free from much of the hard and heavy labour that made his life so monotonous and weary, gives him what he needs at low rates, and enables him to obtain that leisure which is as valuable for the life of the mind and the spirit as food and clothing are for the life of the body.

Fig. 20.—Water, Milk, Fish, and Wheat come to Bradford from outside

Fig. 21.—Wool is sent out from Bradford in return for what comes in

The people of Bradford, for example, obtain their water supply from hills thirty miles away, milk from the farmers of the plain of York, bread from the farmers of East Anglia, and fish from the fishermen of Grimsby and Yarmouth, and in return for these and many other things they send away the productions of Bradford mills.

VIII

A COTTON HANDKERCHIEF: ORGANISATION OF INDUSTRY: FIXATION OF SKILL AND CAPITAL

LOTHES are made from other fibres besides wool, *e.g.* flax, silk, cotton, and of these by far the most important is cotton. Perhaps a cotton handkerchief represents the simplest finished cotton article that we use as part of our personal outfit. Small, cheap, insignificant as it looks, it is the product of an organisation as complicated and world-wide as that which handles the wool and woollen fabrics of the world.

The cotton industry in the British Isles is located chiefly in a few places, the most important of which lie in South Lancashire and in the west of Scotland, in the neighbourhood of Glasgow. In the beginning these districts, with their ports Liverpool and Glasgow opening to the Atlantic, were the most convenient for the reception of the raw cotton, the bulk of which came and still comes from America. To-day there are other and more important reasons why the industry should remain and expand in the same districts, and with these reasons we will deal later on in this chapter.

If in order to possess a cotton handkerchief we had to grow, spin, weave, and bleach the cotton,

we should spend much more time over the business than it would take to earn enough money to buy several handkerchiefs made by the united forces of many men and coal.

The production of raw cotton will be dealt with in Chapter XII. We can begin our story here with the unloading of the bales of cotton at the docks. They have been imported by a cotton-broker, and no sooner have they been delivered than they are carted away or stored in warehouses. The cotton-broker sells to the manufacturer, and most of the business of buying and selling of raw cotton is carried on at the Cotton Exchange in Liverpool; Liverpool is the market for raw cotton.

We have already used the word 'market' for a public place in a town where provisions and other things such as sheep, cattle, and wheat are sold. The word as applied to the raw-cotton market of Liverpool has a wider meaning. It includes 'any body of persons who are in intimate business relations and carry on extensive transactions in any commodity. A great city may contain as many markets as there are important branches of trade, and these markets may or may not be localised. The central point of a market is the public exchange, mart, or auction rooms, where the traders agree to meet and transact business. In London the Stock Market, the Corn Market, the Coal Market, the Sugar Market, and many others are distinctly localised. But this distinction of locality is not necessary. The traders may be spread over a whole town, or region of country, and yet make a market, if they are, by means of fairs, meetings, published prices, the post office and otherwise, in close communication with each other.'

At such a market as that held at the Liverpool Cotton Exchange, dealings are carried out with samples and, in this particular case, boys are to be seen everywhere, carrying bundles of cotton wrapped up in brown paper but open at the ends for inspection. If the spinner cannot afford to pay cash for the raw material he requires, he gets it on credit, promises to pay at some future date, and then tries to sell his yarn before the bill falls due.

Amongst the fibres bought by the spinner some will be an inch to an inch and a half in length—*long staple*; others will be but a quarter to three-quarters of an inch—*short staple*. And neither all the long-staple nor all the short-staple cotton is of the same quality. The first business then is *sorting*. Afterwards all the bags of long or short staple, as the case may be, are emptied out on the floor of a room and trodden down by boys till the heap looks like a large haystack. By *mixing* a number of varieties in this way the variations in quality are reduced to a common character; a kind of average is obtained. When the cotton is required in the mill a man with a rake draws a quantity out, downwards from top to bottom, and blends the cotton yet again.

The fibres are now matted together, and before they can be spun they must be drawn apart. They are put in a *willowing* machine where, by means of rapidly revolving rollers covered with spikes, the tangled mass is violently tossed and shaken, and pushed gradually forward to the far end of the machine, loose and free from dust and dirt. Then, just as in the case of wool, follow the two great sets of processes which end with spinning and weaving.

The fibres are now loose but still tangled. They

are put into another machine and the cotton is *lapped*—that is, rolled into layers that look something like a sheet of wadding. It is next the turn of the *scutching* machine, which beats the layers into another lap of more regular quality and thickness. The *carding* machine next takes possession, lays all the fibres parallel to each other, and delivers a thin film which is afterwards drawn into a continuous ribbon-like piece, called a *sliver*. This is round, soft, thick, untwisted, and delicate. It has to be made thinner and stronger. In the *drawing* machine several slivers are combined into one but drawn out to the same thickness as that of the original sliver. The process is repeated several times under the names of *stubbing* and *roving*. Every time the fibres get a little more twisted and the sliver longer, thinner, and stronger. The final machine at this stage is the *spinning* machine, which delivers cotton yarn ready to be made up into hanks for sale to the weaver.

The fineness of the yarn is described by means of figures called 'counts'—'forties,' 'fifties,' 'sixties,' and so on. The smaller the number the coarser the yarn, for 'forties' means that forty hanks weigh a pound, while 'eighties' means that it takes eighty hanks to weigh a pound. The best spinning machines can spin a cotton so fine that 350 hanks go to the pound.

At the weaving shed we get another succession or processes—*winding*, when the yarn is transferred to reels or bobbins; *warping*, the preparation of the long parallel threads of the warp; *sizing*, dipping the yarn in a mixture of starch and water to strengthen the threads; *beaming*, laying the warp upon the loom so as to give the desired breadth of cloth; *drawing in*, each individual

thread of the warp is passed through a loop in a set of strings fastened at top and bottom to thin bars of wood; *weaving*, the interlocking of the threads of the warp and the cross threads of the woof or weft.

When the cloth leaves the weaver's loom it must be bleached to render it perfectly white. It is singed by being drawn through gas jets so that the nap is burned off and the surface left even and smooth; burning is prevented by the rapidity with which the cloth is passed through the flames. It is steeped in water, boiled in milk of lime, washed again, steeped in acid, washed again, boiled in soda, soaked in bleaching solution, washed again, straightened, mangled, dried, damped once more, pressed, and packed in bundles. No one who is unconnected with the cotton trade knows all the processes through which cotton goes, and even the vast majority of those engaged in it are almost equally ignorant; we have given an outline of what must be done only because by doing so can some understanding be reached as to the magnitude and complexity of the organisation required. And the whole process, so wonderful are all the mechanical arrangements, takes only two or three days.

Even so, only part of the story has been told. The cotton has to be dyed. Sometimes the spinner sells his yarn to the dyer and he, again, to the merchant who distributes it. Sometimes the merchant buys the cotton at Liverpool, sends it to the spinner in one of the spinning towns like Oldham, then to one of the weaving towns like Burnley, then to one of the dyeing towns like Bolton, and finally has it returned to himself to distribute to those who have ordered it. In whatever way it is done the market for selling

the cotton goods is Manchester, conveniently situated in the midst of the others. In Manchester the cotton is neither spun nor woven or dyed, but Manchester is the market. Each firm in Oldham or Bury or Rochdale has a representative in Manchester whose business it is to buy the raw cotton and sell the yarn, or buy the yarn and sell the cloth, or buy the cloth and dye it. In Manchester are the offices not the factories.

We have stated that the cotton industry was, originally, localised round Glasgow and Liverpool partly on account of the convenient situation of these ports with respect to America. But there are other reasons to be taken into account. Cotton threads are so brittle that they snap when stretched in too dry air. This decreases work, for if the thread snaps the operative must stop to tie the thread. Hence a humid atmosphere is necessary for fine work. The west of the British Isles is the wettest part of the homeland, and the naturally damp atmosphere of South Lancashire and the west of Scotland is particularly favourable for the manufacture of cotton. But perhaps almost equally important was the fact that weaving, of a kind, was already going on in these places, and at first the cotton was used not to produce purely cotton fabrics but to adulterate other material.

Cotton, like wool, was at first spun and woven in the home; with the introduction of water-driven machinery the work became centralised at spots where the rivers emerged from the hills upon the plains. At the back door, as it were, was water rushing swiftly enough to drive the machinery, while at the front door was level land across which communication with port and market was easy. When the water-wheel was

displaced by the steam-engine, there was no necessity for the industry to migrate elsewhere, for coal was to be obtained in abundance on the coalfields of both South Lancashire and the Central Plain of Scotland. In the beginning, and for a long time afterwards, the conditions controlling

Fig. 22.—South Lancashire, Relief and Cotton Towns
Notice that Manchester is in the centre of a semicircle of towns from Bolton in the north to Macclesfield in the south

the position of the industry were mostly geographical.

To-day the reasons why the industry remains and expands in the places where it originally started, and why new cotton factories are not erected in other quite suitable places, are of a different character. The old reasons still count, but

the fact that the industry is already there counts more. At all the cotton ports there are arrangements for handling the cotton. The machinery for spinning is in one town, that for weaving in another. And just as there are many varieties of woollen fibre which, when woven, give rise to different kinds of fabrics, the manufacture of which is localised in particular places, so there are also special towns employed in spinning and weaving different kinds of cotton. Thus Oldham is noted for fine counts, Bolton for coarse; Blackburn specialises in weaving, Bolton in bleaching, and Paisley in making cotton thread for sewing.

Other branches of the same industry are the manufacture of cotton machinery at Manchester and Oldham and the manufacture of dyes and chemicals at Widnes and St. Helens. The iron for the machinery and the salt for the chemicals are all close at hand.

The chief newspaper of Lancashire, the *Manchester Guardian*, gives information about cotton crops and prices which no other daily paper gives. The market for the raw cotton is Liverpool, though since the construction of the Manchester Ship Canal an ever-increasing amount of the raw material is taken to Manchester to avoid 'breaking bulk' at Liverpool. Steamers carrying 10,000 tons dead weight can reach Manchester, so that there is now direct trade between that city, the Continent, and the Americas. The market for yarn and fabrics is at Manchester where, as at Liverpool, there is a Cotton Exchange visited by representatives of great business houses from all over the world. Manchester is well placed for such a market as it is a natural centre for the line of towns that reach from Bolton to Maccles-

field, in a kind of curve along the foot of the Pennine moorlands. It is linked by canal with other cotton towns in South Lancashire and the woollen towns of the West Riding of Yorkshire, while railways connect it with all parts of the kingdom.

To deal with the many branches of the industry there are, in the cotton districts, huge warehouses, merchants' offices as big as small palaces, hundreds of factories, and thousands of different kinds of business men. Many people have given their *capital*—that is, their savings—in order to construct the buildings and purchase the machinery. And this capital is now *fixed* in the cotton districts, and cannot easily be moved from one place to another as one can move it when it exists in the form of money. This gives us another reason why the industry tends to remain where it is. Then suppose a man wished to start a new factory. It seems, at first sight, as though he might build it, roughly, where he pleased, but he would certainly go, say, to Lancashire, because only there could he find all the people who know all about the different branches of the industry. If he tried to set up his factory elsewhere he would have to get his workpeople from Lancashire, and if they went they would have to move all their belongings, give up all their friends, and sever their connection with the scenes of their childhood. A few might be persuaded to move, but it would be practically impossible to persuade enough differently skilled persons to migrate to a new locality, and, even if it were possible, it would be very expensive.

Again, suppose a cotton operative is out of work he would naturally seek fresh employment in a district where already many factories were

in existence. And then, further, besides the people who know how to make the machinery, the yarn, and the cloth, here too are all the people who are familiar with the commercial side of the industry. with the marketing of both the raw material and the manufactured goods. Thus, besides the fixation of capital in the form of buildings and machinery, there is also a *fixation of skill and labour*. And these are the real reasons why, to-day, any well-established industry tends to stay where it is. This fact is often referred to as 'industrial inertia'—that is, a tendency for an industry to continue in the same place, even if the reasons that led to its establishment should cease to exist. It is one of the most important facts in the study of economic geography.

The magnitude and complexity of the cotton industry that produces, amongst other things, that cotton handkerchief, were set forth in a speech by Mr. C. W. Macara, the President of the Federation of Master Cotton Spinners' Association in 1904, and the quotations that follow, to the end of this chapter, are taken from that speech:—

'It is estimated that the spinning spindles of the world total 104,000,000: there are also 5,000,000 doubling spindles and dependent machinery, such as looms, calico printing, bleaching, dyeing, etc., machinery. Of these, in round figures, 44,000,000 spinning spindles, 4,000,000 doubling spindles and dependent machinery are in Great Britain. There is little doubt that the expansion of the cotton machinery throughout the world has been so great that from 1900 to 1904 the supply of the raw material has been insufficient to run the cotton spindles of the world.

'There is no industry in Great Britain, excepting agriculture, which affords so much employment, directly and indirectly, for the masses of the people as the manipulation of cotton, or which is of more importance to the whole mercantile and industrial system of Europe.'

About £35,000,000 worth of cotton is used each year in our spindles and looms. By the time it has been sold it has reached the value of £90,000,000. Out of the balance of £55,000,000 the largest proportion goes in the payment of wages. The raw material is largely brought to England by British ships. When landed at the ports it forms an important part of the mercantile transactions of these ports, and the warehousing and handling of it employ a large amount of labour. The carrying of this raw material to the cotton-spinning mills forms a substantial source of revenue to some of the most important railway companies and to the Manchester Ship Canal. In the further carrying of the yarn to mills engaged in the weaving branch of the cotton industry another large source of revenue accrues to the railway companies and other carriers.

'Again, the grey cloth has to be carried to the warehouses of the distributors or to the works of the finishers, dyers, printers, bleachers, and ready-made clothing manufacturers; these further processes involve another rate for the railway companies before the goods reach the warehouses of the distributors, who finally are responsible for their distribution to the home and foreign markets; this again brings in further revenue to the railway companies, ship owners, and other carriers. Like the handling of the raw material, the distribution of the manufactured products of the spindles and looms forms another important part of the com-

mercial transactions of the nation, more especially as regards Lancashire.

'The cotton operatives engaged in spinning and weaving number, in round figures, 500,000. The number engaged in subsidiary industries and employments connected with cotton, already enumerated, is more difficult to estimate, but it will amount to another 500,000. Allowing two dependents to each worker, a population of 3,000,000 is represented.

'There are further dependent industries, such as the great machine-making and engineering establishments, which are largely employed with repairs, renewals, and extensions in the British cotton and subsidiary industries, also a portion of the mining and chemical industries; all of which represent a further section of the population. The provision trade is obviously mainly dependent on the masses of the people. In any dislocation of the cotton industry its serious effects on employment generally would be widespread. But it would not end here; the retail, mercantile, banking, professional, and leisured classes would all suffer severely; and so would the land owners, property owners, and the agricultural classes who find their largest markets in the great mercantile and industrial centres of the North of England.'

So much, then, for the industry that gives us a cotton handkerchief for a few pence.

IX

THE FILLING OF THE COAL CELLAR: POWER

E have seen that the importance of the farmer depends on the fact that without the food he produces life would be impossible. But for the success of his operations he is, in his turn, dependent upon Nature. He has to follow her laws, wait upon her pleasure, and submit to her caprices.

The woollen and the cotton operatives who provide us with clothing, the second of life's necessities, are not dependent upon Nature in quite the same sort of way. They attend to machinery which they can start or stop at will, and the changes in the weather do not, to any material extent, affect their operations. But their machines are driven by steam produced in boilers heated by furnaces that are fed by coal. To some extent, then, the factories are also dependent on Nature, for coal is one of her richest gifts. And in the case of our own country the gift has been given in great abundance and of great excellence. On the farm the heavy work is almost entirely done by horses; in the factories it is done by coal. The farmer is everywhere and always fundamental; we cannot do without him, and shall never be able to do without him. In a civilisation like ours the miner is also fundamental.

As things are we cannot do without him either, though we may have to do without him in the future.

The mass of the population of Britain can be roughly divided into two classes, industrial and agricultural, and their distribution over different parts of the country depends largely upon the presence or absence of coal. Where there is no coal we have either waste land, with practically no population at all, as in many parts of the Highlands of Scotland or of Wales, or we have land devoted to farming. In England most of the farm land lies south of a curved line joining the mouth of the Tees to the mouth of the Exe. North of that line are practically all our densest centres of population; the one great exception is London. South of the line are the lands where agriculture forms the chief occupation and where the population is scattered, for a farm employs much fewer people than a factory. The different kinds of farming demand more or fewer people according to the character of the product. Fruit-farming, for instance, employs more hands per acre than stock-raising.

In the industrial areas—that is, on the coal-fields—the population is densely packed (see Fig. 10). Manchester with Salford had, in 1914, 946,000 inhabitants, Liverpool 840,000, Glasgow 784,000, Leeds 446,000, and Bradford 288,000, and there are dozens of other towns with smaller but still very large populations. Factories are situated on coal-fields because they there obtain the coal that supplies power, heat, and light for the manufacture of machinery and tools. The number of employees in some works runs into thousands, and associated with them and living in the same areas are the workers on the roads, railways, and canals

that transport the results of their toil, the merchants, clerks, and other business men who attend to the commercial side of the different industries, and, finally, the people who are employed in feeding, clothing, and housing the millions that get their living through the use of coal.

It will be noticed that the line which separates the industrial from the agricultural areas is nearly the line which separates the highlands and the lowlands. Coal is usually found associated with hills. In Scotland the coal-fields lie along the edges of the Central Plain in Fife and on the Firth of Forth, in Lanark and in Ayr. In England the majority of them are connected with the Pennine moorlands; they are named after the counties where they are found :—

Northumberland and Durham	coal-field.
York, Derby, and Nottingham	,,
Leicestershire	,,
North Staffordshire	,,
South Staffordshire	,,
Warwickshire	,,
South Lancashire	,,
Cumberland	,,

On the western side of the Cotswolds in England is the Bristol coal-field, and recently a new coal-field has been discovered in Kent deep under the chalk.

On the edges of the Welsh highlands there are coal-fields in Flint, in the valley of the Severn, the Forest of Dean, and in Pembroke, while the biggest and most important of all, the South Wales coal-field, lies in the county of Glamorgan.

The Irish coal-fields are few and of little importance. These coal-fields are only the remnants of much more extensive areas, but much of the

coal has been removed by erosion in long past ages. From Fig. 23 it will be seen that coal must have extended over what is now the Pennine Chain, but the coal is preserved only where the

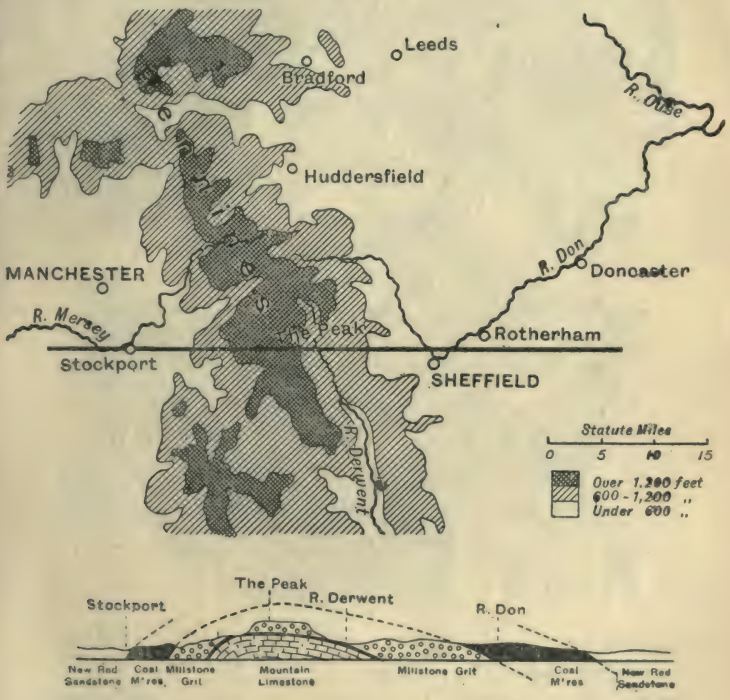

Fig. 23.—Pennines: Relief and Structure

strata dip to east and west under newer rocks. In Scotland the whole area between the Highlands and the Southern Uplands has sunk, the central portion most of all, so that coal has again been preserved.

In South Wales the coal has been folded down-

wards into a great basin. Ireland is poor in coal because the strata lie much flatter, and the

Fig. 24.—Mid-Scotland: Relief and Structure

coal not having been protected has been worn away.

Once again it is necessary to emphasise the

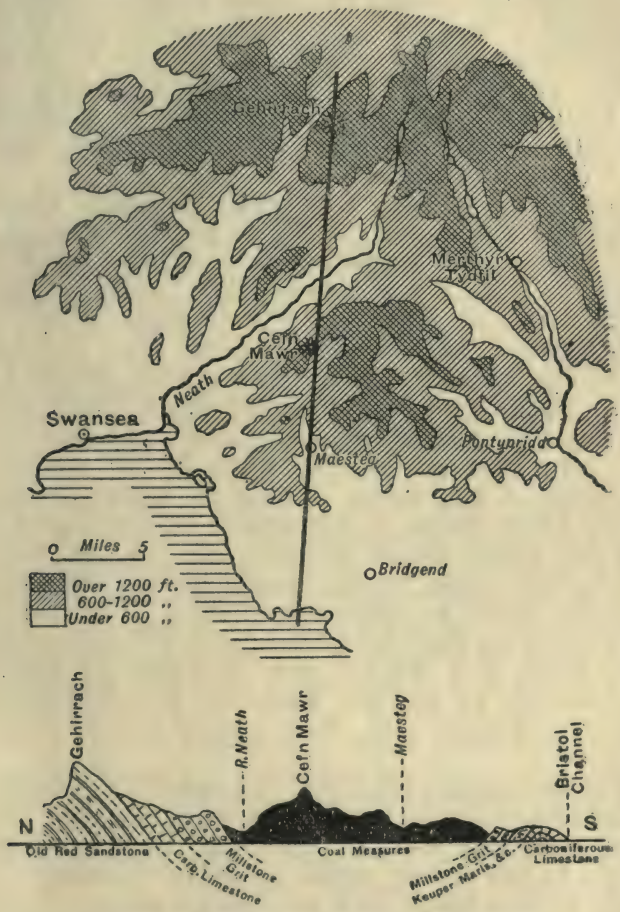

Fig. 25.—South Wales: Relief and Structure

complicated nature of the organisation employed for the supply of one of the essentials of our daily

lives. Before we can burn a single lump of coal in the fire, hundreds of people must co-operate. We think little about them until strikes and other disturbances on the coal-fields call our attention to our dependence on others, and even then we are inclined to think of coal-mining as a matter concerning only the man who 'gets' the coal: the truth is far otherwise.

Our coal supplies lie in layers or seams buried under, and separated by, layers of stone and clay. The seams are comparatively thin; some of them are only a few inches thick, most of them only a foot or two, and the thickest of all, in Staffordshire, is only thirty feet. The thinnest seams are unprofitable to work; they would not pay. The first person of importance in the matter of mining coal is the scientific man, the geologist who, from his knowledge of the rocks that compose the crust of the earth, is able to state whether, at any given place, it is probable or not that coal may be found below the surface. If he thinks it is worth while trying, engineers are employed to bore holes at different points. The boring tools bring up samples of the rocks through which they pass, and enable the engineer to obtain information as to the presence of coal seams, their thickness and their depths below the surface.

If it be decided that coal is present in sufficient quantities to make the mining of it pay, the next thing is to sink shafts. The first shaft is always driven to the lowest point, in order to collect the water that is fairly sure to accumulate, so that it can be easily pumped out. Above this deep shaft, pumping machinery is erected. When the shaft is being constructed, the first five or six feet are dug out by hand and the sides boarded up with

timber. Below this depth special boring tools are used, and the loads of displaced earth are hauled up by a derrick. At times blasting with explosives is necessary to make a way through hard rocks. When a firm bed of rock is reached the walls of the shaft are bricked up. As soon as the bottom of the shaft is reached two galleries or passages, each about twelve to fourteen feet broad, are dug out in opposite directions.

From these main roads narrow passages are driven exactly at right angles and at regular intervals on both sides. Connecting passages are also excavated, so that ultimately the whole seam is broken up into a series of immense squares. When the big square pillars of rock are removed, wooden props are erected for the support of the roof. The coal is cut away by hewers, assisted in some modern mines by machinery.

In Fig. 26 the black bands are the coal seams, each a few feet thick. The two shafts are shown with the winding wheels immediately above them. The engine-room is to the left; it has a big window, not shown, through which the engine-man can have a clear view of the winding machinery. Further to the left is the boiler-house and chimney. The coal is delivered on the right.

The coal is loaded into small trucks which are pushed along the passages by boys. At certain places the trucks are fastened together and drawn by ponies, along light rails, to the bottom of the shaft, where they are raised by means of a steam-engine. On reaching the surface the coal is screened and sorted; the large lumps are separated from those of small size, while the dust is piled up into another heap.

Elaborate precautions have to be taken to venti-

late the mine in order that the miners may have pure fresh air to breathe, and to carry away the dangerous and poisonous gases that escape from the coal. In order to avoid setting fire to inflammable gases, special safety lamps are used; these give out a feeble light, but are so constructed that they can be burned with safety, in an atmosphere that would be immediately exploded by the use of a naked light.

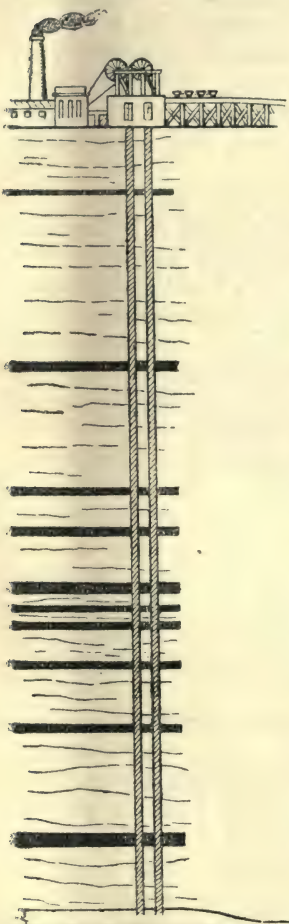

Fig. 26.—Section of a Coal Mine

Amongst the chief people employed in the management of the pit are the *resident viewer* or manager, a man of wide and varied knowledge, experience, and organising power; the *under viewer* or under manager, who is responsible for the proper running of the mine during the temporary absence of the manager; the *overman*, who has charge of the workings of the pit and makes out the wage bills; the *deputy overman*, in charge of each district of the mine; the *master shifter*, who takes charge during the absence of the overman; and

the *master wasteman*, who visits all old workings, examines air-courses, and pays general attention to the ventilation of the mine. The *heap-keeper* superintends the pit-banks, screens, loading of railway trucks, etc.; the *banksman* has control of the shaft-top and the *onsetters* of the shaft-bottom.

If we make a list of the people who have to be paid before we can burn coal in a grate, and whose wages are part of the price of coal, we have the trained geologist, the mining engineer, the men who bore, sink, and make the shaft, the mechanical engineer who attends to all the machinery, the men who work and manage the mine, the veterinary surgeon who looks after the pit ponies, the firemen who are responsible for the safety of the mine, the men employed upon the railways, roads, and canals for the transport of coal in bulk, and the men who distribute it to the houses by means of coal carts.

There are also the coal agents who market upon the Coal Exchange the 240,000,000 tons that are annually raised in Britain, and all the clerks who keep the books and do the correspondence that is necessary as the coal passes from the pit to the fireplace and the factory. In addition, we have the pit doctor who keeps the men in general health and attends to accidents, and the Government Inspectors who see that the Acts of Parliament that regulate the working of the mines are properly carried out.

And in the price of the coal we must also include rates, rent, taxes, insurance, the cost of new machinery and the repair of old, compensation to injured workmen and their families, railway and shipping charges, cost of materials such as timber, rails, bricks and waggons, and, finally, some

return for the thrifty people who have lent their savings to purchase the necessary equipment and make it possible to mine the coal at all.

In the Final Report of the Royal Commission on Coal Supplies, issued in 1905, the total available coal resources of the present coal-fields of the United Kingdom, not exceeding 4000 feet in depth, were estimated at

101,000,000,000 tons.

The resources of the concealed and unproved coal-fields at depths less than 4000 feet were estimated at over

40,000,000,000 tons.

And the Commission estimated that, at our present rate of increase of consumption, all the coal would be exhausted by the end of this century. Thus we see that the coal supplies are gradually coming to an end, and, because we have constantly to go deeper and deeper to win that coal, the price of extraction is ever rising. Hence because of increasing scarcity and increasing cost of working, coal is likely to increase in price. This is a matter of grave consequence to us all. In the first place our huge manufacturing industries depend on coal, and any increase in its price has serious effects on the cost of all our factory products and hinders us in our competition with other nations.

And there is another point to be borne in mind in connection with coal shortage. We cannot obtain from other countries such things as tea, rice, wheat, timber, and rubber without paying for them with things of equal value. When we receive these articles we pay for them, not with money, but with manufactured articles which are sent out in exchange, by services rendered in con-

nection with shipping and in several other ways, and with coal. We export huge quantities of coal as payment, in part, for the shiploads of foreign commodities that are landed on our shores. And every time we either export a ton of coal to another land, or use a ton in manufacturing articles for export, or burn one in our grates and furnaces, there is one ton less of coal for future use. Coal, the savings made by Nature unnumbered centuries ago, is *capital*. Our dependence on coal involves our living entirely on this capital, and once it is spent, it can never be recovered again. Strange as it may seem, even the fertility of our fields is now kept up by the use of coal. A greater yield of wheat is obtained in East Anglia because the ground is enriched by the nitrogen in food from overseas fed to the animals, who use only one-tenth of it, so that nine-tenths go on to the ground as manure. There are people who think that by the time the coal supplies of the world are exhausted the scientist will have discovered a suitable substitute, but all we can say at present is that so far there is nothing known to warrant this belief.

We burn coal in wasteful domestic grates and under steam-boilers, we make no attempt to use many valuable products that escape up the chimney when the coal is burned in open fireplaces, and we have created a smoke nuisance that is a disgrace. There is plenty of scope for brains to attempt to find a solution to all the many difficulties connected with one of the most important products with which economic geography is concerned. We cannot do without coal now, but those who come after us may have to learn to do without coal. The less we waste the more there will be for them.

X

WHEAT: IMPORTS: TRANSPORT

IN the last chapter we have seen how coal pays for things we have not got and also for things, like wheat and wool, of which we have insufficient home supplies. These things, which are sent to Britain in exchange for coal and some other things we shall mention later, are called imports. In this and some of the following chapters we shall see how valuable some of these imports are, how widely scattered the lands from which they come, and yet how little of an accident it is that each is produced in the land from which we obtain it. Of all these perhaps wheat is the most important, for we do not produce more than about one-fifth of the quantity we consume, as is shown in the following table:—

Harvest Year.	Wheat *used* in the United Kingdom.	Wheat *grown* in the United Kingdom.
1909-1910	35,500,000 qrs.	7,900,000 qrs.
1910-1911	33,900,000 ,,	7,000,000 ,,
1911-1912	35,500,000 ,,	8,000,000 ,,
1912-1913	37,000,000 ,,	7,000,000 ,,
1913-1914	34,000,000 ,,	7,000,000 ,,

It follows that huge supplies of this cereal must be imported annually if we are not to experience any shortage of the most valuable element of our daily diet. In Chapter V. it has been stated that wheat is nothing more than a cultivated

grass, so that the necessary supplies are obtained from the natural grass lands of the world. Now the distribution of these grass lands depends upon the rainfall. Where the rainfall is abundant there are thick forests. As it decreases we get a mixture of grass land and forest as in the savanna lands of Africa and the llanos of Venezuela. Where the rainfall is less than twenty inches per annum the forest disappears entirely except along the water courses, and grass land alone is found. There is, then, not enough moisture to support trees all the year round but grass seeds are produced quickly, and even if the old roots die during drought new grass grows from seed to take their place when more rain falls. The same result follows when there are considerable periods without rain. In the colder regions there is not nearly so much evaporation, and less rain is necessary for forest growth. When the supply of moisture is diminished to much less than ten inches per annum we have neither grass nor trees but the barren wastes of the desert. Now rainfall is not distributed haphazard over the world, so that the grass lands and wheat lands also show some order.

Roughly speaking (the rough statement should be corrected by comparison with a vegetation map of the world), there are belts of vegetation arranged from the North Pole southwards in the following order :—

(i) Cold desert.
(ii) Forest, chiefly coniferous.
(iii) Park land or grass land.
(iv) Hot desert.
(v) Hot grass land.
(vi) Equatorial forest.

South of the equator we have the same series of vegetation belts arranged in the reverse order.

Wheat can be grown in practically any latitude, but it grows best where

(1) the annual rainfall is from 15 to 20 inches,
(2) the summer is dry,
(3) there are four months free from frost,
(4) there is a mean temperature for a month preceding harvest of 68° F.

As there are belts of natural grass or park land stretching round the earth both north and south of the equator, so there are wheat belts, or possible wheat belts, covering more or less the same regions. Some regions in the neighbourhood of the grass lands which are naturally forest have been cleared and are also used for growing wheat, though they are not naturally so suitable. This is the case in Britain and a good deal of North-West Europe.

The amounts produced in the chief wheat-growing districts in 1913, given in millions of quarters (480 × 1,000,000 lbs.), were as follows :—

Russia	120,000	million quarters.
U.S.A.	96,000	,, ,,
India	45,000	,, ,,
France	40,000	,, ,,
Austria-Hungary	30,000	,, ,,
Canada	30,000	,, ,,
Argentina	14,000	,, ,,
Australasia	13,500	,, ,,

The wheat-fields of Russia in Europe lie between the Black Sea and the Baltic. From close to the Ural Mountains to the valley of the Dnieper are the famous 'black earth' lands, where the soil is so fertile that two crops a year have been produced without the use of manure. The wheat-fields of Russia in Asia lie in the valleys of the Amur, Ob, Yenisei, and Lena. In the upper

valleys of these rivers there is extremely fertile 'black soil' which grows excellent wheat.

The wheat-fields of the United States of America are chiefly in the great central plain between the eastern and western highlands, but generally in any part north of 36° N. latitude, where the land is not too high.

They are continued north into Canada to latitude 55° N., the most fertile region being in the valley of the Red river. The whole of the western prairie could produce wheat and the northern limit of cultivation could possibly be further extended.

In India the wheat-fields are situated in the central and north-western districts. The plains of the Punjab and the north of the Deccan are the homes of the winter-sown wheats.

In Australia the best wheat lands are in the 'red soil' of Victoria and South Australia. Australia suffers from occasional droughts, and though wheat will stand more dry weather than most other crops, because its roots can go deep in search of moisture, yet some moisture is necessary. Australia usually has a large surplus of wheat for export, but during the drought of the latter months of 1914 the wheat crop failed to such an extent that the people of Australia were actually compelled to import considerable quantities for their own use.

The amount of wheat grown per acre in the different countries varies considerably with the climate, the soil, and the skill and knowledge of the farmer. In England the average yield is about 33 bushels, whereas in Russia, where the methods of production are primitive, it is only 8 bushels; the highest yield is that of the Netherlands, with an average of 37 bushels per acre.

Owing to the fact that the wheat lands are

spread so widely over the world there is a pretty regular supply of wheat each year. Failure of the crops in any one area is usually compensated by abundance elsewhere. There is never any complete failure of the world supply. There is a further result which follows from the wide distribution of the wheat lands, with seed time and harvest coming at different times of the year. This result is seen in the following table; it is a wheat calendar:—

Countries of Production.	Harvest arrives in the United Kingdom.
California	Jan.-Feb.
Argentina	Feb.-March.
Oregon and Washington	March-April.
Australia, New Zealand, Chile	April-May.
India and Upper Egypt	June-July.
Syria, Persia, India, Mexico, Algeria, Central Asia, Japan, Morocco, Texas	July-Aug.
Kansas	Aug.-Sept.
Central Europe, (South Russia), spring-sown wheat in North America, South Canada	Oct.-Nov.
North Canada and north-west U.S.A.	Nov.
(North Russia)	Dec.

But though the wheat lands are so widely distributed there are great areas of grass land which, though quite suitable for wheat growing, yet send none to the world market. For this there are several reasons:—

(i) It takes time to get people to grow wheat. In a country like Australia, that has only been settled in comparatively recent years, the first thought of the settlers is to satisfy their own needs in many different directions before they begin to consider what may be gained by supplying the needs of others.

(ii) There are not enough people to farm all the

available land. For instance, there are fewer people in the whole of Australia than there are in London. Canada, the Argentine, and parts of Siberia are still so thinly populated that millions of acres of valuable land are, as yet, untouched by the plough.

(iii) Absence of capital or skill or both. The most fertile land in the world needs ploughing, sowing, and reaping, and under modern methods this means the expenditure of time, money, and skill. A rich man who could not plough, or a skilful ploughman who had no money with which to purchase a plough and a horse, would be equally useless upon the best of wheat lands. Until men with money and men with knowledge are willing to try their luck on the undeveloped areas, these areas produce no crops.

(iv) Lack of transport. There are parts of the world where it would be easy to grow wheat, but where the cost of getting the harvest from the place where it might be grown to the place where it certainly would be eaten is too high. The cost of transport forms part of the price of wheat (as of everything else that man consumes), and if this be above a certain limit, the wheat cannot be sold in competition with that which is more cheaply transported. Natural routes by land generally lie along river valleys or across plains, but the cheapest form of transport is by water. The same power that will draw a ton of goods on land will draw many more on water, as can be seen by comparing the ease with which one horse can pull a barge of coal or bricks upon a canal and the difficulty with which a number of horses can pull the same material in a number of carts on a road. Then, too, the surface of the ocean, unlike that of roads

or railways, costs nothing to build or repair. So the wheat lands that are earliest brought under the plough, for the purposes of the world market, are those that lie nearest the sea or have means of communication by water. And the farmer

Fig. 27.—Routes of Wheat Export

Notice that the wheat is transported along river valleys, and wherever possible by water. The two chief lines of export are by the St. Lawrence and through New York

is best situated who can transfer his harvest by water, all the way from the land of its growth to some great market, without having to break bulk *en route*.

The wheat areas of North America have the enormous advantage of comparatively easy transport, not only by land but through the great lakes,

either to the St. Lawrence or by the Erie canal to New York.

Amongst the other cultivated grasses used for food are oats, maize, rye, and barley. The average yearly world production of these grains in millions of bushels is:—

Oats	3602	million	bushels.
Wheat	3241	„	„
Maize	3492	„	„
Rye	1572	„	„
Barley	1207	„	„

From the above table it is seen that only the amount of oats exceeds that of wheat, but large quantities of oats are used for feeding animals, so that oats are not so important a food for human beings as wheat.

North America (U.S.A. and Canada) grows about one-quarter of the world's wheat, and though Europe heads the list in total production (see p. 100), America heads the list in total export, as is shown in the following table for 1913-1914:—

Country of Export.	Thousands of Cwts.
United States	30,496
Canada	24,977
Australia	14,300
India	11,477
Russia	9,566
Argentina	6,991

In America and Canada the farms are of enormous size. From Winnipeg to Edmonton there is practically one wheat-field for the whole 800 miles and some of the individual farms are nine miles long. The land looks as flat as a billiard

table, so far as the eye can reach, or, at most, but gently undulating. Hence it is possible to make the fullest use of machinery, and on some of the farms, when the grain is ripe, large machines are sent to the fields which cut, thresh, and bag the wheat ready for delivery as they travel round the field. When this is not the case, the wheat may be cut by steam-driven or horse-drawn reaping machines that are often almost invisible in the distance, so completely are they hidden in the unbroken ocean of golden grain. The grain is left by the reapers standing in stooks at uniform distances. Then the steam threshing machine is hauled up and placed in position. To the accompaniment of the whirr of the wheels the stalks are sucked in, the grain beaten out, and the straw discarded in an endless stream, either to feed the furnace of the engine or to be disposed of as rubbish. From morning to night, and day after day, the work goes on, with the briefest cessation for meals, till darkness puts a stop to the operations.

As the grain is wrested from the ears, it falls with a loud purring sound into the sacks, which are completely filled in a few moments, or into capacious box-waggons to be driven away the moment they are filled to the nearest railway station. There it is either sent at once to market or discharged into a tall elevator. The latter is the more usual procedure, and we can imagine the waggon backed into the base of the elevator and its contents tipped into a huge hopper which automatically weighs the load and then dumps it into the storage bin to await the call of the market. When the harvest is all in, processions of heavily-laden trains, some of which are often half a mile in length, are hauled by mammoth locomotives

to the terminal elevator where the grain is stored until it can be shipped.

Forty per cent. of the whole wheat crop of Canada thus finds its way to Fort William and Port Arthur on the shores of Lake Superior. Here are the largest elevators in the world. 'The scene within the terminal elevator when the rush is at its height is like the interior of a bee-hive when the inmates are at the zenith of their honey-making industry. The whole place seethes with activity, and the roar of sound rushing from the mass of machinery is so deafening that it is impossible to make oneself heard in conversation. A string of railway cars laden to bursting point pulls in, and before you can realise what is happening they are moving out again, having disgorged their contents, and another train enters. You jump into a lift and are whisked to the top of the building. You pass along a narrow bridge and find yourself surrounded on all sides by dark yawning circular wells, 200 or 300 feet deep and from 15 to 20 feet in diameter. These are the storage bins, each capable of holding thousands of bushels of wheat. At the top is a chute, its mouth hanging over the side of the well, while the other end leads on to an endless belt. A man opens the door connecting the chute with the conveyer-belt. Immediately there spurts forth a wide *cascade* of wheat.

'When filling is in full swing, the noise produced by the tumbling grain resembles the roar of a *waterfall.* If you close your eyes and listen to the steady, purring roar you might imagine yourself beside Niagara. The air is thickly charged with dust, and the men deviating the *streams* of wheat in this or that direction appear like phantoms in the gloom. When a shaft of

sunshine penetrates the mist and glints upon one of these *cascades*, the grain is lit up with a golden sheen and sparkles like crystals.

'Above you is a hopper as large as the average suburban drawing-room. You hear wheat falling into it in a rushing *stream*. Presently there is a tinkle and the whole fabric gives a slight dip. It has struck the tell-tale and the weight of the grain within is recorded. Then a louder roar is heard: the outlet of the hopper is open and the grain is tumbling down a large duct communicating with the hold of the steamer alongside. In a few seconds the roar ceases; the hopper has been emptied and the fainter murmuring indicates that refilling has commenced. Day and night the round continues. So soon as one ship is laden down to the water's edge with grain another warps her way into the berth, the discharge pipes are lowered into position, and it is not many seconds before the patter of the grain falling into the hold of the steamer is heard.'[1]

In the above account we have printed certain words in italics. They bring out the point that wheat can be treated, in bulk, like a liquid; it is almost liquid in the way it flows, and by realising this fact, and inventing machinery to take advantage of it, the grain can be handled cheaply. One big operation costs less than a large number of small ones, and so the wheat is lowered in price. But that price must include the cost of all the machinery we have described and the wages of the people who work it, from the steam plough all the way to the elevator and thence to the ship. And, moreover, the crews of the ships and the builders of the ships, that bring the grain across the ocean, have each to be paid, and, at every

[1] *World's Work*, vol. xvi.

stage of the process, the people who have lent capital require an adequate return for the loan of their money.

Freight is paid on all goods that have to be carried by land or water. Shipping *freight* is the price paid to the owner of the ship, or to the man who hires it, for the carriage of merchandise. It covers the wages of the seamen engaged, the expenses incurred in the shipping business, and the interest on the money lent by people, out of their savings, in order that the ships and offices may be built. And as a ship does not last for ever, a certain sum of money must be put aside each year for the purchase of new ships at a future time. This, too, has to be paid by the people who consume things that come from abroad.

Another charge to be noted is *dock-dues*, payments made for the use of the docks. Docks are expensive to make and maintain; they require much costly machinery and big buildings, and they employ large numbers of people all of whom require something for their trouble. It will be seen that part of the cost of things from overseas is something like the cost of water; it is a price paid for making the means of bringing the goods to us so that we do not have to go to fetch them.

In the case of our daily bread, we are dependent not only upon the farmers of our own land but upon the labour of thousands of farm hands and engineers who toil to feed us in America and in other distant lands, and upon the courage and skill of those who carry the results of their labours across the seas that lie between.

XI

MEAT IMPORTS

F we depended on wheat grown in the British Isles for the bread we eat there would be thousands upon thousands of people who might never taste wheaten bread in all their lives. Similarly, if we depended for our meat on the animals reared in Britain we should most of us have to become vegetarians. Our foreign supplies are obtained as set forth below :—

U.S.A.	7,000,000 cwts.
Argentina	5,000,000 ,,
Canada	2,000,000 ,,
New Zealand . . .	2,000,000 ,,
Australia	1,000,000 ,,

In each of the countries mentioned above it is the wide spaces of untilled grass land that feed the cattle, sheep, etc., that are sent to us in such enormous quantities. Cattle, in particular, were the animal pioneers upon the vast plains that the white man won from wild animals and native peoples in America and Australia during the nineteenth century. The strength, size, and speed of the cattle enabled them to withstand or flee from dangers that would have been fatal to sheep, and their ability to withstand both cold and rain permitted them to spread into colder and damper places than sheep, so that, in America for instance,

they are found wherever there is grass, all the way from the Straits of Magellan to Hudson Bay.

As we have already pointed out that the grass

Fig. 28.—North America: Rainfall

The dry lands are in the Middle West

lands are the sources of the world's supply of cereals, it would seem that wheat and cattle might probably be in competition wherever natural pasture lands are available. But this is not

really the case. The rainfall over these wide open spaces varies very considerably, so that there are many thousands of square miles where, though there is enough rain to grow grass, yet there is not enough to permit the growth of wheat.

It would, it is true, be possible to rear cattle on those parts of the grass lands now devoted to wheat, but wheat could not be grown without irrigation in those drier areas that are used for the rearing of cattle. The farmer in possession of grass lands suitable for either wheat or cattle can make a choice, and he chooses wheat rather than cattle because, of the two forms of farming, wheat growing is the more profitable. To some extent a compromise may be made and mixed farming may replace wheat.

Not all grass lands where cattle might live are as yet extensively used. The question of transport is an important one when such bulky beasts are concerned. Hence the cattle ranches are, on the whole, within convenient reach of water transport either by river or sea. This is particularly true of South America.

The three greatest meat-exporting countries are the United States of America, the Plate region in South America, and Australasia. Of these, as shown in the table above, the U.S.A. are the most important. North America has high land on east and west and, in between, a broad plain running north and south from the Gulf of Mexico to the Arctic Ocean. It is divided by the Mississippi into two areas, an eastern and a western one. The western area stretches from New Mexico to Missouri, and from Iowa to Texas, and extends northward into Canada. It is a huge expanse of grass land where the air is clear and bracing,

the ground is firm and dry, and the supply of water is sufficient at almost all times.

The large cattle farms are called *ranches*. The biggest of all these is in Texas; it has an area of 5000 square miles, *i.e.* about the size of Yorkshire, and considerably larger than the total area of Kent, Surrey, and Sussex. It is, however, now being divided into smaller sections, but it was originally 200 miles long and 25 miles wide and was enclosed by more than 1500 miles of wire-fencing. Upon it there were 100,000 cattle, in charge of 150 cowboys. Because the rainfall on the western plains is scanty, the grass is thin, a tuft here and there, so that it is necessary to allow as much as 20 to 25 acres of land as a feeding-ground for each animal. A ranchman who owned 1000 cattle would, under these circumstances, require at least 20,000 acres upon which to feed them properly. Everything, to be profitable, has to be on a big scale.

Fig. 29.—North America: Natural Grass Lands
The natural grass lands are in the Middle West, where the rainfall is under 20 inches per annum

At one time the ranch lands were unfenced and the cattle wandered hither and thither at their pleasure. There is no need, even in the winter, to drive them to shelters to be housed

and fed, for owing to the heat in July and August and the comparative dryness of the air, the grass is converted into hay where it stands. It is left just where it grows, and the cattle can wander about and live on it all the winter through. There has been a slight decrease in the amount of land available for ranches, owing to the fact that more and more land is irrigated for crops and also that much of the land has been worn out; the grass, especially in times of drought, was eaten so close that it never seeded and its place was taken by inedible weeds. The disappearance of the grass allowed the surface to be worn away by wind and water, and large tracts of the plains are no longer able to support as many cattle as formerly. As a consequence, many of the ranches, particularly in the southern states, enclose their farms and regulate the use of the land.

During the summer the cattle in the open country migrate to the slopes of the mountains, where food is then more plentiful and there are trees to offer shelter from the fierce sun. In the winter they return to feed on the lower plains. Twice a year it is necessary to 'round up' the animals, some of whom may have strayed a hundred miles from home. The object of the autumn round-up is to separate those animals suitable for beef and send them to market. In the spring the cattle are collected with their calves in order that the latter may be branded. In either case the cowboys divide into small groups, spread out in a huge circle, and then gradually drive the animals in towards the centre. The work of detaching a mother and her calf, in order that the calf may be branded, is both difficult and dangerous. They have to be pushed out of a bellowing irritated mob of

semi-wild beasts by the cowboy on his pony; the calf is then lassoed by throwing a rope round the hind legs. It is brought to the ground and the owner's mark burned in the flank by means of a hot iron. The work of detaching, lassoing, and branding is often accomplished in a few minutes; the process of rounding-up, especially in the spring, often lasts for weeks.

Despite the picturesque scenes of cowboys shown by cinemas and depicted in tales of adventure, the lives they lead are lonely and monotonous. They live in the saddle in the open air, watching stray cattle, tending young calves and, in very cold weather, driving the herds to more sheltered places. They are exposed to severe cold and terrible blizzards at one time of the year and to scorching heat at another. Wolves may attack the herds, prairie dogs may destroy the grass, rattlesnakes may bite the cattle, and the beasts must not be allowed to feed on poisonous grasses. It is customary, now, to store supplies of grass called alfalfa, in order to guard against a possible failure of the natural winter supply of food.

The Plate region includes the Argentine and Uruguay. It is neither very hot nor very cold, and well supplied with nutritious grasses that are suited for sheep and cattle. The water supply is sufficient and rain falls more or less regularly throughout the year. This region is a future rival of North America as a meat-producing land. There are hundreds of square miles where nothing else is to be seen but grass land with herds of cattle, flocks of sheep, and droves of wild horses. The cowboy, or gaucho as he is called, rounds up and brands the cattle in a manner similar to that employed by his brethren of the

north. But as the climate is warmer, the cattle find plenty of food on the plains, or pampas, the whole year round; there are no hardships of winter weather or scarcity of food, and there is no necessity to supply shelters.

So profitable is cattle-farming that in the Plate countries there are five horses and cattle and ten sheep for every person in the land. Meat is produced and eaten in large quantities; the gaucho's allowance is about 5 lbs. per day! The farms are of enormous size, some of them reaching 700,000 acres, though the average is about 250,000 acres. The days of absolutely open country with the consequent never-ending wandering of cowboys and animals are here, as in North America, gradually coming to an end. The tendency now is to fence off the land into 'small' fields of about 2000 to 3000 acres, each of which has its own stream, well, or water trough. Cattle are kept in paddocks; sheep are herded in flocks of from 1500 to 2000. On these estates the houses of the owner and the

Fig. 30.—South America: Natural Grass Lands

manager are situated somewhere near the centre. There, too, are the quarters of the labourers, the sheds, and the other farm buildings. An orchard, a few trees, and a vegetable garden complete the picture.

The pampas of South America promise to be much more valuable in the future than they are at present, for large areas are suitable for cultivation; most temperate and sub-tropical plants grow well, and there is plenty of room for a much larger population, as over vast areas there are only thinly-scattered tribes of Indians.

The cattle selected for sale for beef at the autumn round-up are not always fat enough for the butcher owing to lack of food or water or both, and they are therefore sent somewhere to be fattened. In the southern U.S.A., near to the cotton belt, they are supplied with plenty of cotton-seed cake, one of the most valuable of cattle foods.

Cattle on ranches are not reared for dairy purposes; it would be impossible to milk them regularly, and there is no market near enough at hand to which the milk could be sold. The object of the rancher is to produce beef not milk, and then to get the beef to those populous districts where there is a big demand for meat. The densely populated meat-eating lands are in the east of the U.S.A. and in Western Europe. To reach the latter the cattle have to be brought across the ocean, and at one time they crossed it alive. Thousands of beasts were brought down to the ports and sent to Britain in cattle-boats. They were not improved in condition by the two thousand miles or more of ocean travel and the hardships they suffered on the way. On arrival they were either put out to grass to be fattened

for the butcher or, if fit, they were slaughtered at the port of entry.

When the animal is slaughtered in the land where it is reared, the difficulty is to prevent the decay of the meat during the time taken to carry it to distant markets. Under ordinary conditions meat rapidly becomes unfit for human consumption. It can be preserved for a while by salting, but salt food is not very wholesome. It can be dried in the sun, and it can be preserved better still by being cooked and sealing it, while hot, in air-tight tins. The cooking kills the germs of decay within the meat and the sealing keeps the germs of decay outside from entering. But neither salt, dried, nor tinned meat satisfies the taste of the British meat-eater; he wants fresh meat. Now the fact that meat keeps fresh for a long time in cold weather suggested the idea of preserving it by freezing or chilling. By methods that we cannot here describe the temperature of the holds of the ships carrying meat and other foods is reduced below freezing-point. The invention has revolutionised the meat trade and made it possible to bring fresh food to us from the farthest ends of the earth. In 1911, 13,000,000 carcases of lamb and mutton were imported from Australia and New Zealand and 250,000 tons of beef from Argentina. There are now hundreds of ships fitted with refrigerating machinery and divided into a series of rooms, in each of which the temperature is regulated to suit the particular kind of food in that chamber. Mutton, for instance, can be packed close and subjected to a very low temperature; beef is hung and the temperature of the chamber kept at from 30° to 32° F.

Cattle that are to be canned, tinned, frozen, or turned into beef extracts are collected at

great centres like Chicago in U.S.A. and Fray Bentos in South America.

At Chicago, the biggest meat market in the world, 150,000 animals are dealt with daily. They are collected in stockyards where there are miles of streets and over fifty miles of troughs full of food. The animals are killed almost instantaneously and suffer little or no pain. In about half an hour from the time they are dead they are cleaned, skinned, and ready to be cut up. It is not, however, the part of the animal that we eat that is the most valuable to the owners of the stockyards and the factories.

In every 1000 lbs. of dead animal there are 440 lbs. that cannot be eaten. If these 440 lbs. were thrown away, either the rancher would have to take less for his animal or the consumer would have to pay more for his food. But they are not thrown away; the Chicago 'packer' has led the world in converting what were waste portions into marketable commodities. Lard and margarine are made from the fat; buttons from the bones; combs from the horns and hoofs, and leather from the hides. Altogether about a thousand different saleable by-products are manufactured from the waste, and, broadly speaking, it is on these by-products that the packers make their profits. There is often an actual loss on the sale of the flesh, and in the best of years the profit on the meat that is bought by the public is only somewhere between a farthing and a halfpenny a pound.

At Fray Bentos in Uruguay are the factories for the manufacture of Oxo, Lemco, Bovril, and other similar meat extracts; there is also a great industry in tinning tongues. In one of the largest of the meat-extracting plants over 4000 animals

are dealt with every day. At the Lemco factory a quarter of a million Hereford cattle, fed on the Lemco and Oxo estates, are killed every year, while the Bovril lands send, annually, 10,000 Durhams to be slaughtered at Santa Elena. The manufacture of these different extracts arose out of the great waste of beef in Argentina, at a time when it was not possible to send the meat in a fresh condition across the sea. The hides and the bones could be exported but the meat was wasted. Then Baron von Liebig suggested that it might be possible to make a beef extract, and as a result of the suggestion, Liebig's extract was made in Uruguay, but no farther back than 1864.

If we attempted to trace the number of people who have to be paid before the cattle on the ranch become beef on the table we should have to set down a list as long, if not longer, than that which we have made out for some of the other industries. The beef-eater has to pay the farmer and his assistants, the dealer, the exporter, the importer and the retailer ; none of them is willing to work for nothing. Then, for the carriage of the animals, as for the carriage of wheat, trains and ships are employed; trains require railways and ships require docks. So that we must include in the price of the foreign meat a portion of the wages of the engine-drivers, guards, signalmen, porters, clerks, sailors, engineers, navigators, the builders of trains, railways, ships, and docks. All these services must be paid for. Partly they are paid for by services we render, and partly are they paid for by coal and the work done by coal.

XII

RAW COTTON

N Chapter VIII. the position of the cotton industry in the British Isles was described, but nothing was said of the growth of the cotton plant. This chapter deals with the production of the raw material and shows that the production of a cotton handkerchief is an even more complicated piece of work than it was pointed out to be.

The plant on which cotton is produced varies very much in size; in some countries cotton is grown on a tree; in America, whence come most of our supplies, the cotton plant is a small shrub from 2 to 4 feet in height. As it grows, it throws out a large number of flower-stalks at the ends of which the flower-buds develop. Some of the blossoms are yellow, but the American variety is, on the first day of opening, white or pale yellow or cream; on the second day of growth it is darker and redder; on the third or fourth day the petals fall to the ground leaving behind a tiny *boll* or capsule. The boll grows till it is of the size of a filbert or, in some species, of a hen's egg, when it bursts and reveals a number of compartments which are filled with seed and a mass of beautiful, white, silky fibres (at this stage called *lint*) growing around and attached to the seed.

For profitable production cotton requires certain climatic conditions, and its cultivation, com-

mercially, is almost impossible outside the areas where the special conditions are fulfilled. These conditions include, first of all, a relatively high temperature. Cotton enjoys a warm atmosphere or even a hot one provided the supply of moisture be suitable. At first it grows slowly, and a light frost may do much injury, as cold checks the growth of the plant and the ripening of the fruit. It is a sun-loving plant and sunshine is of the first importance.

Then, also, the total rainfall and the season of the rainfall have much to do with successful growth. A small amount is preferable to an excess, for heavy rains favour grass and weeds which are a pest to the farmer. During early growth frequent showers at night, with intervals of bright sunshine during the day, provide the kind of weather in which cotton rejoices. The ground is kept moist, but the young weeds can be hoed, and killed by the sun. During the ripening period, however, dry weather is desirable.

These conditions, it will be seen, are rather different from those required for grass, and therefore cotton is not grown in those extensive regions that we have pointed out as most suitable for the cultivation of wheat and the rearing of cattle. They are found only in warm regions, where the winds blow from the sea to the land, bringing frequent showers. The following table indicates, by the figures there given, the countries where the conditions are best found :—

The World's Annual Production of Cotton

U.S.A.	2,600,000 tons.
India	800,000 ,,
Egypt	300,000 ,,
China	300,000 ,,
All other countries	200,000 ,,

The chief cotton-producing section of the United States, 'the cotton belt,' lies a little south of latitude 37° F. and includes all the lower-lying parts of South Carolina, Texas, Georgia, Alabama, and Mississippi, but not the cooler mountain regions. In the islands off the south-east coast, 'sea-island' cotton is grown. This is the finest quality in the world but the quantity is small. The West Indies have suitable climatic conditions, and at the end of the eighteenth century they supplied 70 per cent. of the cotton imported into Great Britain. Production fell when the planters found they could make more money by growing sugar, but it is once more increasing.

In India cotton is grown chiefly in the western parts of the Indo-Gangetic plain, and on the 'black soils' of the Deccan plateau, 1000 to 2000 feet above the level of the sea, on the eastern side of the Western Ghats. The moisture is brought by the summer monsoon and is not very abundant, as the south-west winds deposit most of their moisture on the western sides of the mountains. In fact the rainfall is so light, and the droughts that follow the monsoon are so severe, that it would be impossible to grow cotton in this district if it were not that the so-called 'black cotton soil' is of such a nature as to retain sufficient moisture to mature the cotton. The yield is smaller than in the United States and, as the fibre is shorter, the quality is poorer.

The amount of cotton grown in Egypt is less than that in India but the quality is better. Egypt has no rain, but the Nile floods the land each year, and thus supplies an abundance of fertile mud and of water for irrigation. The alluvial soil, the flood waters, the almost continuous sunshine, and the steady rise of temperature

from spring to summer with the steady decline from summer to autumn, make Egypt the best, if not the biggest, cotton field in the world. This field produces 500 lbs. of cotton per acre, which is double the yield of any other country; unfortunately the area of production is small. The fibre is long and strong and commands a high price.

Let us consider in a little greater detail the cultivation of cotton in the United States. The entire surface of the soil is ploughed, harrowed, and re-harrowed until an ideal seed-bed is obtained. When this has been accomplished the cotton seeds are sown in rows from 4 to 5 feet apart. The planting takes place in March or April. When the young plants have established themselves they are thinned with hoes till they are from 20 to 30 inches apart. This thinning-out process is called 'chopping.' Frequent cultivation or moving of the soil is necessary, to keep down the weeds and grass which spring up constantly and menace the young plants, and to break up the top soil and prevent evaporation. Everywhere the farmer has not only to sow his crops and gather them, but he has to prepare the ground before the crops are sown, and he has to attend to them while growing if he wishes to get the best results. When one field has been put in order for a time, another requires attention, so that there is continuous work all the year round. This is all only another variety of farming; the farmers, somewhere or other, are responsible not only for our food but for the wool, flax, silk, leather, and cotton with which we are clothed.

At the time of harvest the bolls burst open, exposing their white and silky contents, and

'Though I gaze upon no waste of snows,
The endless field is white ;
And the whole landscape glows
For many a shining league away.'

Into these acres of the whitened harvest troop hosts of black pickers, of all ages and sizes, from the toddling babe to the tottering grandfather. Each picker carries, suspended from the shoulder, a sack into which the cotton is placed as soon as plucked. At the end of each row are larger baskets into which the pickers empty their sacks whenever their loads get uncomfortably heavy. The work is light but requires skill, and, as in the case of tea, it is chiefly the women and children who provide the necessary nimble fingers. The hardest part of the work is stooping to pick the bolls from the lowest branches. Pickers vary much in ability ; some can collect as much as 300 to 350 lbs. a day, others no more than 100 lbs.

Picking is the most expensive operation in the production of cotton. Wheat, corn, oats, and potatoes can be harvested by machinery, but not cotton. It is picked and harvested by hand as it was a thousand years ago. At one time the work was done by slaves, but there are now no slaves and all labour has to be paid for. The cost of labour is steadily increasing, and a negro earns much more now than he did ten years ago. And better payment for the negro means dearer cotton for the consumer, for the consumer pays all the wages of everybody from start to finish. Attempts have been made to invent a mechanical picker and several forms have been tried, but so far without any great amount of success. The difficulties that any machine has to meet with in this case are, first, that the blossoms do not all grow

at the same height, and, secondly, that the bolls do not all open at the same time. Four or five pickings must be made at different times, and the machine has not yet been invented that knows how to pick the open cotton and leave the closed. Owing to the expense involved in gathering the cotton harvest, cotton, like tea, can be grown to pay only where labour is abundant and cheap, as it is amongst the negroes of America and the peasants of India, Egypt, and China.

When the cotton is gathered it consists of a mixture of fibre and seed which requires separation. For many years the separation was performed by hand, a process so slow that the fastest workman could not pick more than a pound a day. As long as this had to be done, cotton was dear. Then a tremendous advance was made by the use of the cotton-engine or cotton-'gin'—a revolving cylinder with rows of teeth about half an inch apart. As the cylinders revolve, the teeth draw the fibres through screens of wire-netting and leave the seed on the other side.

Until about 1870 the seed was regarded as a veritable nuisance; it accumulated in vast heaps about the 'gin'-houses and was difficult to dispose of. A little of it was spread over the fields as manure, some was burned, and some was thrown into running streams. Mills were, in fact, often placed near running water for this reason alone. But now the seed and the things that are made from it have become of the greatest importance. This is not extraordinary, for the seed of every plant contains a great deal of nourishment stored up to enable the seedling to start life. The cotton fibre is merely a 'fluff' like that of the dandelion, by the aid of which the wind spreads the seed in a wild state without help from man. The seed,

then, is pressed, and a valuable oil is extracted; the residue is made into cotton-seed cake or meal and forms a valuable feeding-stuff for cattle.

When the cotton leaves the ginning machine it is in a very loose condition and has to be compressed into bales for convenience of carriage, by large bale presses worked by hydraulic power.

The destinations of the bales are the various countries where cotton is manufactured, and the points of departure for these destinations are usually the ports nearest to the cotton fields. Thus the cotton produced in Arkansas, Tennessee, Northern Mississippi, and Alabama is exported from New Orleans, that in Texas from Galveston; other cotton ports in U.S.A. are Charleston, Savannah, and New York.

The two greatest consumers of raw cotton were the U.S.A. and Great Britain. The chief cotton-manufacturing district in America is New England, where the history of the industry is something like what it was in our own country. That is to say, spinning and weaving were first carried on by hand and then by water-driven machinery. New England was specially well supplied with water power, and there is a long line of waterfalls, the 'fall line,' along the eastern side of the Appalachians. The position of the towns such as Fall River and others along that line indicates the use made of water power in the past. At first it paid to bring the cotton to the place where skill and capital were fixed. To-day on the coal-field at the southern end of the Appalachians, in the states of Alabama and Georgia, the cotton industry is growing. This district possesses several advantages; both coal and cotton are close together, the expense of transport is saved or reduced, and wages are not

so high as in New England. Even with these advantages this district could not for a long time compete with fixed skill and capital in New England and Lancashire, but the advantages are slowly having their effect and there is the less cotton for Lancashire and New England.

Fig. 31.—Map to show the fall line east of the Appalachians. It marks the change from rock to alluvium. Where each river crosses the fall line it tumbles over the rock and forms a waterfall. Notice that there is a town at each waterfall

The British cotton manufacturing areas have already been dealt with. Our industry depends chiefly upon people in America, but also upon those in parts of India and Egypt who grow the cotton, and upon those who carry it to us across the seas, as well as upon those who weave and spin in Lancashire. This dependence is not usually realised by us, but there was a time, during the American Civil War, when it was realised to the full. During that war, when the northern states were fighting the southern states over the question of slavery, the supplies of raw cotton sank to a low ebb and the factories of Lancashire were mostly idle. Thousands of people were thrown out of work, and at one time there were more than 350,000 who had to be supported by

public or private charity. Some emigrated to other lands, and local authorities arranged various kinds of relief work, but still the distress increased. As the cotton famine continued, small shopkeepers and others who had depended for their living upon the money earned and spent by the operatives, were added to the long list of those in need of assistance. Through the medium of suffering, men began to understand something of the way in which the happiness of one part of the world is linked up with the happiness of another.

The chain that binds us to the other lands is always longer than at first appears. In the case of cotton it is anchored at one end in the plantations of the States, passes through the factories of Lancashire and has, perhaps, its other end in India or Africa, where some dusky maiden is partly clad with the product of the British looms. Negro labourer, Lancashire lads and lasses, African peasants—each and all are interested in the labour of the rest. And yet we can get that pocket handkerchief so cheaply. Who would care to make it, right from the beginning, at the price?

XIII

MARKETS: CUSTOM

Revision and Summary of Part I.

N this chapter, which closes Part I., we propose to revise and expand some of the more general ideas that have already been introduced. We have, for instance, in previous chapters called attention to one or two of the meanings of the word 'market,' and have shown that the word does not express quite the same idea to the farmer carrying his home-grown wheat to the nearest country town as it does to the great merchant, buying cotton from distant lands, in the Cotton Exchanges of Liverpool and Manchester.

Markets originated at places which could be easily reached. Where main roads crossed each other, or where rivers could be forded, or were bridged, at such spots people met for purposes of exchange or barter. Money was not used before Roman times, and trade was limited by the clumsy method of exchanging goods for goods. For many years after the introduction of money there were no written receipts, and the only evidence of a business transaction was that obtained, when necessary, from the testimony of an eye-witness. At these early simple markets refreshments were sold from booths or stalls; later, the place of the booths could be partly

taken by the inn, a permanent building where the needs of both man and beast for food and drink were supplied. Another permanent building at the common meeting-place was the blacksmith's forge, which rendered services in connection with transport—shoeing horses, repairing carts—as well as making simple tools used by the farmers. As crafts developed and men began to specialise in different kinds of trade, some of the craftsmen would also set up their homes and workshops where there were certain to be buyers, and finally, when the population at such a centre was large enough, a church would be built. Very often the process was reversed, and the market grew up under the shadow of the church or castle. In this way many towns came into being and clustered round a market square.

With an increase in trade the original square would become too small, and the buying and selling would overflow into the neighbouring streets. The names of some of these streets—Bread Street, Milk Street, etc.—serve to remind us of this fact and also to preserve for us the custom of the market that each commodity should only be dealt with in a particular place—cheese here, poultry there, pottery somewhere else. Conduits were constructed to bring water, a market-house was provided for the officials who collected the tolls and managed the market, and pens were erected for cattle, though occasionally the cattle-market was held in another place altogether.

As men began to specialise in the various crafts and became less and less self-supporting, the farmer from the countryside supplied the ever-growing town with food, and the artisan of the town supplied the country with various

forms of manufactured goods. At first the market only dealt in articles of necessity; fashion and luxury played little or no part in the demand of the buyers. The market was purely *local*; owing to difficulties of transport its business was confined entirely to the people of a very limited area, and the actual amount of goods exchanged was extremely small. Each family provided for itself. There was not even trade between one part of the country and another, and the price of wheat, except in so far as it might be fixed by law, depended only on the relationship between the local supply and the local demand.

In the course of time the population of the country increased, men specialised still more in industry, industries themselves got localised in ways with which we are already in part familiar —woollen in Yorkshire, cotton in Lancashire, and so on—and, at the same time, roads, bad as they were, were much improved, and it became possible to exchange things made or grown in one part of the country for things made or grown in some other part. Trade ceased to be local and became *national*, and the prices asked in the market began to depend, not on local supply and demand, but on the supply and demand of the nation as a whole. The 'market' had a wider area.

Within the last century or so, coal, iron, and steam have introduced fresh conditions. We are no longer dependent for, say, wheat upon the fields that lie close at our doors or that may have been cultivated in some other part of the kingdom. Supplies are obtainable with rapidity and certainty from places as widely separated as Canada, Argentina, Egypt, India, and Australia. And the price in the market depends neither on local

nor on national demand, but upon the supplies and demands of the whole world. Trade has become *international*, and the 'market' is a world market 'for any commodity that is either produced or consumed over a large part of the world, and is sufficiently portable and durable to permit people in widely-separated regions to be interested in buying and selling the same consignments of it. In the days of the sailing vessel, the world market was unimportant, because, with the unsatisfactory, slow, and costly means of communication, only a few valuable and non-perishable commodities could be transported long distances.[1] The staple commodities of the world trade and the world market were spices, silks, tea, coffee, furs, and curios made by the peoples of different races.

'The staple articles of a century ago are no longer the staples of the great world market. True, they are handled in greater quantities than ever, but cheap and bulky goods have now become the staples since all continents have their railroads and all oceans their steamships. Thus spices, for which India was once so important, are now tenth in her list of exports. A century ago, tea, coffee, and spices were the chief foods on the world market. To-day the important food staples are wheat, corn, oats, rice, sugar, beef, pork, mutton, potatoes, apples, oranges, and bananas.

'The world-market staples of clothing a hundred years ago were silks and furs—luxuries for the rich. To-day they are cotton, wool, hides, skins, cotton-cloth, shoes, and hats—the clothes of the masses. . . . A century ago commerce brought for the equipment of man in his activities little

[1] It should not be forgotten, however, that Venice owed its importance to trade of this kind.

but lumber,[1] trinkets and curios. To-day there is a world market for iron, steel, cement, coal, ores, locomotives, machinery, jute, hemp, and other fibres.

'The ability to buy and sell in the world market has quadrupled the population of the western world. It has revolutionised our daily life and our industries. It enables us to take full advantage of natural resources and to produce on a large scale for the people of foreign lands.'[2]

Once a market has been established, no matter whether it be a local or a world market, it is an extremely difficult matter to move it. All the offices, warehouses, central and other buildings are there, and they represent capital that cannot be transported. This fixation of capital tends to the fixation of markets.

But, apart from this, there is a tendency for a market to remain where it is on account of what we may call the conservatism of human nature —that is, its dislike to change. Most people get into the habit of doing things in a particular way or at a particular place, and there is, in all of us, a certain amount of laziness which increases as we grow older and which expresses itself in this unwillingness to try new methods. The mother who has always bought shoes at a certain shop is tempted to continue buying at that shop, at least so long as she is satisfied with what she purchases. She knows the people in the shop and they know her. The boots at another shop may be just as good and just as cheap, perhaps even a little cheaper or a little better, but she is unaware of this, and generally does not bother to make any inquiries about the matter.

[1] In the sense of 'useless things.'

[2] *Commerce and Industry*, J. R. Smith.

Now this conservatism, or laziness, or habit, or whatever other name we care to bestow upon it, is the basis of a very great deal of the trade of the world. It can even be bought and sold. A doctor, for instance, has 'a practice'—that is, a certain number of people who know him and his house and who are accustomed to go to that house for treatment and advice. If he leave the neighbourhood he can sell the 'practice' to some one else. His old patients are not obliged to go to his successor but they will (not all of them, but certainly a majority), because they have got into the habit of going for their medicines and advice to a particular place. What the doctor sells, when he sells his practice, is just the dislike of human beings to tread new paths. He sells one of their habits.

This is even more the case with the sale of a business. The price paid for a business includes the contents of the shop, the fittings, and also what is called the 'goodwill.' This goodwill is nothing but the habit that certain people have of going to that shop, and is worth much or little according as the amount of trade done there is great or small. It is presumed, and the presumption is worth a definite price that can be calculated, that those people who usually deal at that shop will continue to deal there even though the proprietor whom they know may depart. The word 'customer' means the person who has a custom or habit of going to the shop, and the shopkeeper is said to have his 'custom.' It is exactly the same with the big markets as with the little shops. Hence markets, such as the cotton market at Liverpool or the wool market at London, tend to get fixed both by the fixation of capital and buildings and by the conservatism of human nature.

Old-established markets are where they are, not only because of the reasons which caused them to be there established, but mainly because they are already there. The people who use them may

Fig. 32.—Centre of Manchester

Here in the very centre of Manchester, just as in Newcastle (Fig. 16), we see the Market Place beside the Cathedral and the Bridge. Close by are the Exchange and the Corn Exchange and Market Street

change; both dealers and customers drop out, one by one, but they never all drop out at the same time and, as each one leaves the place or dies, another steps into his place and there is a long succession of people with similar interests and desires, and the market remains and grows.

In a purely local market where purchases are often small in quantity, the buyer sees and examines in bulk the things which he wishes to purchase, but it would be impossible for the wool, wheat, cotton, or other staple commodity of world trade to be taken to the Exchange and there displayed in bulk. Some other method must be adopted. Take, for instance, the sale of tea,

Fig. 33.—The Markets of London

London is so big that there are many markets, but they are all either within or close to the old city

sugar, cocoa, hides, spices, shells, and drugs at Mincing Lane in London. When the tea, for example, is landed in London the importer informs the Mincing Lane brokers of this fact. They send their representatives to the docks to take samples and then the importer advertises the forthcoming sale in the *Public Ledger*. He places the samples on exhibition in the sample rooms, where would-be buyers can examine them and estimate what price per pound the tea is worth.

After a while the cargo is sold by auction to the highest bidder. A man may purchase a ship-load of tea and perhaps sell it again to some one else, in the course of a day or a week, and yet never have seen the ship or the cargo at all; he has seen nothing but samples. If, later on, there is any dispute as to whether the samples are fairly representative of the bulk, the matter is settled by an arbitrator whose decision is final.

Many of the things we import have to pay other charges. A market implies ordered government: without it no exchange of goods would be possible. But government must be paid for, and a considerable part of the money necessary to pay for the expenses of government is obtained by placing taxes on some of the goods imported into the country; a few states tax exports also. Such taxes on foreign commerce are called tariffs or *customs duties*, and they are collected at the port of entry or exit. The officials whose duty it is to collect the tax are customs officers, and the place where they conduct their business is the custom-house.

Passengers arriving at any port are liable to have their personal luggage examined, in order to prevent them bringing into the country cigars, lace, playing-cards, and other small but valuable articles which are subject to duty, unless they pay the taxes required by law.

When merchants import tea, wine, tobacco, or any other of the dutiable articles they usually store them in warehouses under the supervision of the customs authorities. The goods are then said to be 'in bond.' As long as they remain in bond they pay no duty; when the merchant, however, wishes to 'clear' them, or take them out of the warehouses for sale, he first pays the

necessary tax and is then given permission to remove them whenever he pleases. There are comparatively few articles that are subject to import duties in English ports; in the case of those that are, such as tea or tobacco, the duty is included in the price charged to the consumer. If the tax is increased the price goes up.

In a great city like London there is an immense variety of produce, and it is necessary that there should be some order in the storage and amongst the merchants who own the produce. There are, therefore, warehouses close together for spices or wool, vaults for wine, yards for timber, and so on. And near to the stores are the various exchanges or markets where, as already explained, the product is sold by sample, and not at fixed prices, but by auction to the highest bidder.

We may now summarise our ideas of trade. Trade assumes something produced and exchanged, and this 'something' comes primarily from Nature. Water, coal, iron, stone, grain, grass, fruit, animals are all part of or dependent upon the land. But though Nature gives these things abundantly she will not yield them without some effort on the part of those who wish to utilise her gifts. Hence to produce, man must labour, using both muscle and brain and, to labour to advantage, he must understand the laws according to which Nature acts. That is to say, production depends to a very large extent on geographical conditions of soil, climate, and position. These conditions can sometimes be slightly modified or controlled by man but, on the whole, he cannot substantially change them, and he gets the best results when he is working in harmony with and not in opposition to them.

But this is not all. A coal-miner may work as

hard as he pleases and produce an abundance of coal but he cannot eat or dress with it ; the farmer may reap abundant crops but he cannot warm himself with them. It is necessary for the farmer to exchange some of his wheat or flour for coal, and for the miner to exchange some of his coal for wheat ; in this way each of them is both fed and warmed. In order, however, that there may be anything to exchange, each of them must produce more than he needs for his own use. If neither of them worked at all there would be nothing to exchange ; the more they produce the more surplus there is to barter or sell for something else.

Now if every acre in England were utilised to the fullest, and there were neither waste nor laziness, we could not obtain either enough food for the present population, or enough raw materials for our manufactures, and there are some raw materials, like cotton, that we could not produce at all. We need to exchange our surplus for other surpluses in many different parts of the world, and therefore there must be some one with special knowledge to bring about the exchanges between ourselves and other nations. This ' some one ' is the merchant. He not only procures the exchanges, but he stores or provides beforehand such quantities of the necessaries and comforts of life, that we are usually untroubled by scarcity.

In order to bring about the exchange we need roads, railways, canals, motors, railway trains, and ships. Connected with these are stations, harbours, and docks. To conduct the business of exchange we need offices, warehouses, postal services, telegraphs, telephones, and a host of clerks, cashiers, managers, and directors, and all

these must be paid for their services or they will not work. In addition the expenses of government must be paid for.

Hence when we buy a piece of woollen cloth we have to pay for the services of the farmer and his men who reared and tended and sheared the sheep, of the people in the factories who spun, wove, dyed, and finished the cloth, of the wholesale and retail dealers who distributed it to the shops, of the railways and all the workers connected with the transport of the wool or the cloth, and, when we turn it into a suit or a dress, we shall set in motion another stream of people, like the tailor and the dressmaker, with all their assistants and those who make their needles, buttons, thread, and machines. And, all the time, we are utilising the services of those who keep law and order, whether they are clad in the blue of the policeman or the blue of an admiral of the fleet, whether they administer justice in an out-of-the-way village on the outskirts of civilisation or in the Law Courts in the Strand. There is, then, included in the price of any article, a part of the wages of a huge number of people, and the marvel is not that things are sometimes dear but that they are ever cheap. They could not, in fact, be cheap unless they were produced on a very large scale.

PART II

XIV

WOOL

HE woollen manufacture in the British Isles is, for the most part, located near the sheep pastures, but the day has long since gone by when the hills and downs of Britain raised enough sheep to supply the spinners and the weavers with the huge quantities of raw material which their mills and factories require. The greater part of the raw material that is converted into woollen fabrics by the operatives of the north comes from the countries shown in the following table. The figures give the average import for one year:—

Australia	297,000,000 lbs.
New Zealand	155,000,000 „
(United Kingdom)	133,000,000 „
South Africa	79,000,000 „
India	42,000,000 „
Argentina	36,000,000 „
France	22,000,000 „
Chile	18,000,000 „

There are other countries where large quantities of wool are produced, but the people of these lands either use most of it themselves or do not send it to Britain. The above table refers only to our own sources of supply.

The market for at least two-thirds of our imported wool is in London. The wool is unloaded and warehoused there, sold by auction there in the Wool Exchange (Fig. 33), and is then distributed to the different manufacturing centres. As no wool is manufactured in London, and as London is itself far from all the places where that manufacture is carried on, it seems, at first sight, rather strange that the market for raw wool should be where it is. But the explanation is a fairly simple one. There was a time when wool was the most important article of *export* from England; most of it went to certain parts of the Continent, where it was made into cloth and, in that form, brought back to us. Some went as far away as Italy, and there is in existence a letter dated 1284 which tells how an Italian merchant bought up wool from English monasteries to be manufactured in Florence. The people of Flanders and the neighbouring countries obtained practically the whole of their raw wool from Britain, and, as London was the port nearest to the Continent, the fleeces were sent there to be sold. The men who reared sheep knew that they could depend on finding in London men ready to purchase the wool that they wanted to sell. And men who wanted to buy knew that in our capital they could depend on obtaining what they required.

But England was not for ever to remain content to furnish Europe with raw material. As early as the time of Edward the Black Prince, the king invited clever workers from Flanders to settle in the east of England, to gather round them people willing to learn how to spin and weave, and thus enable Englishmen to turn their own raw material into the finished fabric. And in later

Fig. 34.—World: Natural Grass Lands

The grass lands are where the rainfall during the year or some considerable part of the year is small

years, in one way or another, the manufacture of cloth at home was encouraged by the State. The nature of the wool trade gradually changed, and by the time of Elizabeth wool was imported to England and cloth exported; in fact the export of raw wool was forbidden by law. And as the years have rolled by this change has become intensified and fixed, so that we have become importers of wool rather than of woollen cloth. The old position has been entirely reversed; but the point to note is that the change was gradual and not sudden. Hence, for reasons explained in the last chapter, the market in London tends to remain where it is, though the reasons which caused it to be established there have vanished.

Though London remains the greatest wool market in the world, other markets have risen or are rising to positions of importance. For instance, the Australian clip was, at one time, sold almost entirely in London; now the greater part of it is sold, in the first instance, by auction in the coast towns of Australia and New Zealand to buyers who gather there from all the industrial centres of the world. Some of these places are where the raw wool is produced, so that the rise of markets in places like Melbourne and Sydney is exactly similar to the rise of London as a wool market during the Middle Ages in England, which was then one of the great producers. Antwerp, too, aided by its splendid waterways and its nearness to France and Germany, has become a great wool market, chiefly for South American wools, while Liverpool, Glasgow, Bradford, Amsterdam, Hamburg, Havre, Marseilles, Boston, Philadelphia, and New York each have important wool markets.

Now the distribution of wool-producing coun-

tries is not haphazard. It depends on natural or geographical conditions. The source of most of our wool is the sheep, but it must not be forgotten that other animals also supply similar raw materials. Thus we

Fig. 35.—Europe: Winter Rain

obtain a long, lustrous, silky wool from the angora goat and alpaca wool from the Peruvian llama.

Sheep belong to the grass lands. These grass lands, as already indicated, provide us also with wheat and cattle. The different products of the

grass lands vary according to the rainfall, nearness to the sea, available labour, and so on. Wheat is the product of the best-watered grass lands and of some lands that have been cleared of forest, cattle of the less well-watered, and sheep of the

Fig. 36.—Europe: Summer Rain

driest. Even in Britain sheep are most plentiful where it is driest underfoot; on the eastern side of the Pennines are the sheep that gave rise to the woollen industry of Yorkshire (Fig. 19). On the drier east side of the Southern Uplands are the sheep that gave rise to the manufacture of tweed in the valley of the Tweed. Sheep are bred, too,

in the dry plains of the east of England about Lincoln and Leicester, where the rainfall is small, on the chalk downs of the east and on the limestone hills of Gloucestershire and Somersetshire, where the water sinks into the ground and leaves the surface dry. Even where the ground is dry enough the climate may be too wet for the wool to be good. And such varieties as the Scottish black-faced mountain sheep or the small Welsh mountain sheep are reared rather for the value of their sweet and juicy mutton than for their wool. The best wool is obtained from those sheep that are fed on dry moors or hills, like those of the Downs.

The typical sheep country is the drier part of Spain. Spain is a fairly high plateau, the average elevation of which is over 2000 feet. On the whole, Spain is a dry country. On comparing Figs. 35 and 36 it will be seen that Spain is the only country of Peninsular Europe a considerable part of which has less than ten inches of rain in both summer and winter. On the plateau very little grows and the population is scanty. The rivers that flow from it are long but shallow and, owing to their lack of water, are not of much use for irrigation. Only one, the Guadalquivir, can be ascended from the sea by ocean-going steamers. The vegetation of the plateau consists chiefly of shrubs, coarse grass, and sweet-smelling plants like juniper and peppermint. On this pasture thousands of sheep find suitable nourishment and the dry climate improves the quality of the wool. The Spanish plateau is the home of the merino sheep, the variety that produces the finest wool. Its carcase is small and its fat is strong in flavour but its wool is superb. A merino sheep will produce as much as 30 lbs.;

the wool of the average English sheep weighs only from 3 to 6 lbs. And not only is the wool greater in quantity; it is the longest and most valuable known. In the summer the sheep are taken up into the mountains and there guarded, in thousands, by the shepherds and their dogs; in the

Fig. 37.—Europe: Summer Temperature

winter, when the cold is intense, they are brought down to more sheltered pastures.

At one time Spanish cloth had a great reputation, and in order to keep the manufacture of merino wool entirely in Spanish hands, it was made a felony, punishable with death, to export merino sheep. But George III. received a few as a present and eight of them were sent to Australia, where they became the pioneers of the huge flocks for which that country is now famous;

they have flourished so well that the Australian merino is a finer animal than its Spanish ancestor.

The chief wool-producing countries are given

Fig. 38.—Europe: Winter Temperature

in the following table. The figures refer to annual averages:—

Australia	573,000,000 lbs.
Russia	408,000,000 "
Argentina	347,000,000 "
U.S.A.	271,000,000 "
New Zealand	160,000,000 "
United Kingdom	133,000,000 "
Uruguay	87,000,000 "
South Africa	83,000,000 "

Of these the chief wool-exporting areas are Australia and New Zealand, the basin of the Plate (Uruguay and Argentina), and South Africa. It

will be noticed that the wool-producing countries lie on two belts round the world, the reason being that these are the grass-land belts where usually it is too dry for crops or even cattle.

Along the east of Australia the land rises fairly quickly from the sea, and on these mountains the moisture brought by winds from the sea is condensed, leaving the interior dry. Moreover,

Fig. 39.—Australia and New Zealand: Mean Annual Rainfall and Wind Systems

Australia is a warmer land than Britain, so that there is more evaporation, and the same amount of rain is not so effective in the former as in the latter. Further, sometimes rain fails altogether, and there are occasional droughts all much more harmful to the wheat lands and the cattle pastures than they are to the sheep pastures; hence the greatest of all Australian products is wool. Sheep were the foundation of the prosperity of this continent and are still the basis of her greatest

industry. Wool to the extent of several millions of pounds is exported every year, and in no part of the world has wool-raising reached a higher standard of perfection. The country on which the sheep are fed varies considerably. In Victoria, where the pasture is good, the air dry, and the temperature moderate, the sheep get an abundance of tender grasses. In the tract between the Darling and the Murrumbidgee—the Riverina—they sometimes seem to be finding a meal on land that appears to contain about as much nourishment as an asphalt tennis-court. West of Bourke they subsist mainly on salt-bush, the finest of all foods for sheep. The animals reared on this plant produce the finest and the densest fleeces. There are other native plants which the sheep will eat when grass is unobtainable.

The sheep stations differ in size and character. As a rule, the nearer the station is to the coast, the smaller is the run and the larger and more elaborate are the farmhouses and outbuildings. As one travels west, the runs increase in size and the houses diminish in comfort. A really large sheep-run may be from 500 to even 1000 square miles in extent and carry from 70,000 to 100,000 sheep. A succession of good seasons will make the sheep owner a rich man; two or three poor ones will ruin him. The great drawbacks to Australian farming are floods and drought. During recent years attempts have been made to store up water for the dry seasons and these have been attended with considerable success. Artesian wells are being bored, often to great depths, in order to tap the water-bearing strata underlying a large part of the plain country of Queensland and New South Wales. These artesian wells are amongst the greatest blessings that Australia

has received, and there are now hundreds of them in the two colonies mentioned above.

New Zealand lies in the southerly belt of westerly winds (Fig. 6). These winds strike a range of mountains that runs from north to south and leave their burden of vapour on the western side. Hence, as in the case of the Pennine moorlands, the western side is wet and the eastern side is dry. In South Island the dry level Canterbury plains are nearly 160 miles long and 30 miles broad. Here is the home of the 'Canterbury' lamb that figures so largely in the butchers' advertisements. The Canterbury plains will probably always be a sheep-farming district and supply the world as they do to-day with large quantities of both wool and mutton. New Zealand possesses one great advantage over Australia in that it never suffers from drought.

South Africa is another plateau; it rises in a series of terraces from a moist strip along the coast, to the high veldt which stretches far and wide towards the interior, and spreads out into the great southern tableland which contains the Kalahari desert. The chief winds are the south-east trade winds, but they lose their moisture on the eastern slopes of the plateau. Hence the coast has an annual rainfall of 30 or 40 inches, while in parts of the Great Karroo the annual rainfall is only 5 inches. The atmosphere of the Karroo is dry, one of the conditions necessary for successful sheep-rearing. As the grass is very thin the farms are very large, ranging from 3000 to 13,000 acres; most of the sheep belong to the merino breed. Goats can live where sheep cannot, as they do not confine themselves to grass but will eat bushes, etc. There are so many goats in some parts of South Africa that their flesh forms the chief fresh-

meat supply. The best breed is that of the angora goat, which was imported from Persia and Kashmir. Its beautiful long silky hair is the *mohair* of commerce, and the angora goat is reared in such numbers in South Africa that this part of the world now produces the largest supply of mohair. The Orange Free State and the Transvaal are both of them almost entirely pastoral countries with extensive grazing grounds for sheep and cattle, and sheep-farming is the most important occupation of the people. The Boers drive their sheep, in the winter, to the northern marshy veldt or bush-veldt as it is called; in the summer, when the rains have produced a new supply of grass, they bring the sheep back again to the high veldt.

Fig. 40.—South Africa: Mean Annual Rainfall

The South African farmer's special trouble is the presence of such animals as the jackal, lynx, leopard, wild cat, and other beasts of prey that raid his flocks. It is thus necessary to bring the sheep home at night and shut them up in a kraal. This custom, though beneficial to the sheep, is destructive of the veldt. 'By the continuous grazing which necessarily takes place no part of the veldt is ever rested. Flowers are eaten off and possible seed destroyed. Young plants are nibbled down or trampled out, and bushes are gnawed, especially by the goats. In this manner

the veldt is becoming worn out over wide stretches. The best remedy is the construction of jackal-proof wire fences, within which stock can graze at will, undriven by the shepherds, and allowed full freedom day and night. Subdivision of the farms into camps with ordinary fencing gives the veldt an opportunity of resting, and allows the sheep that change of pasture which is so necessary for them. The system is still in its infancy, but in this direction lies the redemption of the veldt.'

The Plate basin includes parts of the countries of Argentina, Uruguay, and Paraguay (Fig. 30). Through them flow the rivers Paraguay, Parana, and Uruguay which form the great estuary known as the Rio de la Plata or Plate river. In their lower courses they cross the grass lands called the Pampas, which support large quantities of sheep and cattle.

Argentina is a rather dry country, for it lies in the southerly belt of west winds and they lose most of their moisture on the western slopes of the Andes. The grass is suitable for cattle, horses, and sheep, and they are reared in millions. They are tended by mounted shepherds of Indian blood who may be compared with the cowboys of North America. The part of the country specially noted for sheep is the dry district of Patagonia, and from here there is a growingly important export of wool as there is from Australia and New Zealand in the same latitudes. Uruguay has more trees than Argentina ; its wide grassy plains rear the finest cattle, but the sheep are smaller and have poorer wool than those of Argentina.

Thus the areas where wool is produced are arranged in an orderly way, and it will be noticed that, just because the grass lands are of great

extent, we are dependent for our supplies of wool, not on the people of one country only, but on those of many countries in different parts of the globe. But it must be noted that the wool-producing countries are not obliged to send all their wool to us, and in fact do not do so. That from South America, for instance, goes chiefly to north-west Europe. Some of it goes to countries like France that have specialised in a particular kind of fibre, have invented machinery specially suited to deal with it, and produce a particular kind of fabric. It will be remembered that we have seen a similar form of specialisation in the cotton industry of Lancashire, where in Oldham 'fine' counts are spun and in Bolton 'coarse.'

Just as towns are characterised, here and there, by the use of one or a few kinds of fibre or of cloth, so in countries, as a whole, sometimes the same kind of thing is done and the raw material best suited for their particular wants is bought up and used. Then, too, some of the wool goes to other lands simply because it is more convenient for the growers to send it there. We must get rid of the idea that the rest of the world is compelled to sell to us all the wool or other raw material it produces, at the cheapest price. Only those things will be brought to Britain which can be paid for by commodities which other people wish. The people of each country handle and will continue to handle their produce, whether animal or vegetable, not for the benefit of the people of Britain, but for their own advantage.

XV

RUBBER AND MARGARINE

WE have said a great deal about the grass lands and how they provide us with wheat, cattle and hides, sheep and wool, and we have said something, too, about those warmer lands where cotton grows. From such areas of the world's surface we derive much that we require to satisfy our daily needs. We also make demands upon those hot wet equatorial forests that were described in Chapter I. From them we obtain other things that, in our time, have become necessary to our existence ; of these the two chief are rubber and margarine.

RUBBER

Rubber provides us with no food and, except in the form of rainproof coats and rubber footwear, with not much in the way of clothing. But in the form of tyres on motor lorries it makes transport easier and so renders us services in connection with the supply of both food and clothing.

Rubber is the juice or sap of a tree ; plenty of sap means plenty of moisture and points to the fact that the rubber tree is a native of wet climates. There are several varieties of the tree, but the most important is the well-known Para rubber tree which is found growing wild over large areas of the Amazon valley and furnishes the best rubber

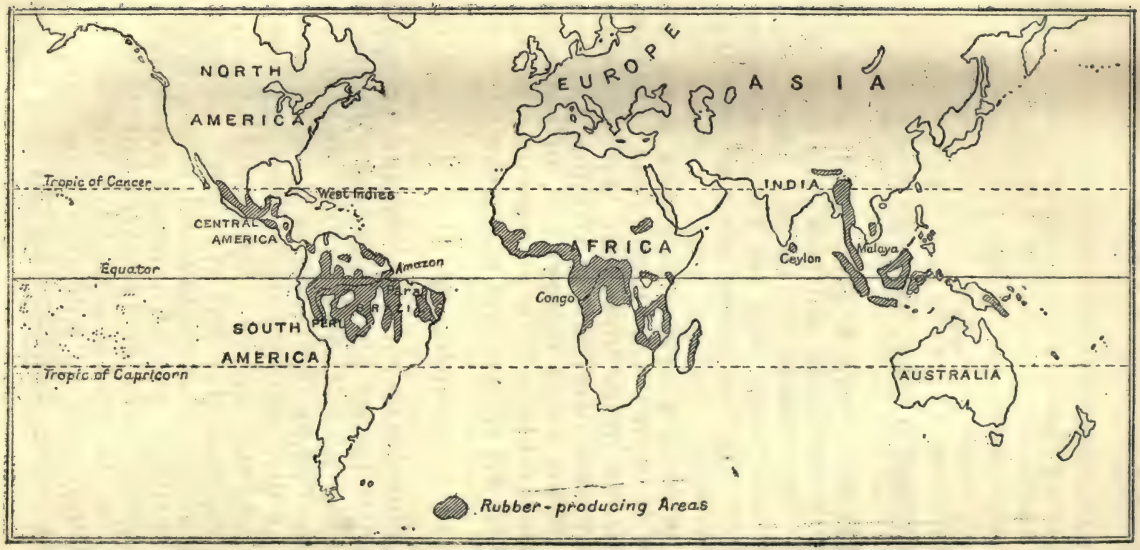

Fig. 41.—World: Rubber

This map should be compared with Fig. 2. It is thus evident that rubber grows in the region of the equatorial rain forest where there is great heat and moisture all the year round

of commerce. It will be sufficient for our purpose to deal with this species only, as it is the chief source of the world's supply. We are already familiar with the climate of the Amazon valley, its uniformly high temperature and its heavy rainfall well distributed throughout the year. In the lower part of the river the mean annual temperature lies between 76° F. and 81° F., and the annual rainfall is between 80 and 120 inches. The heaviest rain falls between October and March when the sun is south of the Equator; the driest months are July, August, and September. It is in these three months that the rubber is usually collected.

The native rubber collector selects from 100 to 150 suitable trees and connects these by a path which begins and ends at his hut. He starts work in the early hours of the morning, 'taps' the trees, and returns to his miserable abode. A little later he makes a second round for the purpose of collecting the juice or *latex* and, finally, in the evening of the same day he converts the latex into solid rubber.

The trees are tapped with a small axe whose cutting edge is from 1 to 1½ inches in length. With this a number of cuts are made in the bark in a slanting direction. At the bottom of each cut a small tin cup is fixed, by means of a lump of clay, and in this the sap collects as it oozes from the tree.

In order to coagulate the sap the collector first makes a small fire which is fed, from time to time, with the shells of certain palm nuts that give off dense clouds of smoke. 'He then takes a round pole of wood about six feet long, which he supports at one or both ends so that the middle portion can be held in the smoke. A small quantity of latex is poured on to the centre of the pole, which is immediately turned round and

round in the smoke until the latex is completely coagulated, forming a thin film of rubber. This procedure is repeated until the whole of the latex obtained in the day's tapping is coagulated, and it is continued day by day until a sufficiently large ball of rubber is formed, which is then removed from the pole. These balls of rubber weigh from 44 to 132 lbs., and when cut they are seen to be built up of a number of well-marked concentric layers of rubber each of which represents a day's yield.'

Climatic conditions similar to those of the Amazon valley are also to be found in Central America, the West Indies, equatorial Africa, India, Ceylon, the Malay Peninsula, and the Malay Archipelago. Until recently rubber was obtained entirely from wild plants in the wet equatorial forests of America, Africa, and Asia, about half of the total supply coming from the Amazon valley. Here the trees grow without man's help and the rubber is obtained with no more trouble than that involved in collecting it. But when rubber became valuable owing to its increasing use in commerce and the possibility of a diminution in the supply owing to the destruction of large numbers of the wild trees, then men turned their attention to the question of cultivating it.

Naturally the places with conditions like those in the Amazon valley were first thought of, and naturally also those from which the rubber could most easily be brought were selected for experiment. Thus the idea that it would pay to cultivate rubber resulted in seeds being conveyed from Brazil to Ceylon. Ceylon is unlike the greater part of India in that a considerable amount of rain falls in Ceylon in both summer

and winter. There the seeds were planted and carefully reared by British growers. The experiments were so successful that there are now thousands of acres in different parts of the British Empire devoted to the growth of this tree. How rapidly cultivation has spread is shown by the following figures :—

	Ceylon.	Malaya.
1901 . .	2,500 acres.	....
1905 . .	40,000 ,,	50,000 acres.
1910 . .	200,000 ,,	362,000 ,,
1912 . .	230,000 ,,	621,621 ,,

The cultivated rubber is called *plantation* rubber, to distinguish it from the *wild* rubber of America and the West Indies.

The seeds are sown in nursery beds or seed baskets and the young plants are transplanted during rainy weather in order that they may not suffer from loss of moisture. They grow quickly, and in Malaya, where the conditions are specially favourable, cases have been known of trees attaining a height of 20 feet and a girth of 8 inches in one year after being planted out. For three or four years careful weeding is necessary in order that the growth of the trees may not be interfered with.

The cultivated Para trees, and it is this variety which is chiefly cultivated, are ready for tapping when, at a height of 3 feet from the ground, the circumference measures from 18 to 20 inches. In Malaya this happens in about four years, but in the other countries where plantation rubber is produced, a period of from five to seven years is necessary. Tapping is not usually carried higher than 6 feet from the base and is best performed in the early morning or evening. The planters make use of a number of different kinds

of knives and tools and do not confine themselves to the simple axe of the South American native. Because they wish to render the plantations as profitable as possible, they have studied different methods of making incisions and have introduced collecting cups of aluminium, enamelled iron, glass, and even paper.

At the factories the latex is first strained to free it from such impurities as bark, twigs, leaves, and dirt, and is then poured into flat circular or rectangular pans. Acetic acid is added and coagulation takes place. When the latex has been converted into a solid mass it is treated in various ways, according to the quality of the rubber desired or the purpose for which it is to be used.

The areas from which we import most of our raw rubber are given in the following table:—

	Imports in 1911.
Brazil	£7,935,000
Straits Settlements	3,354,000
Malay Straits	1,608,000
Ceylon	1,309,000
Peru	711,000
French West Africa	456,000
Gold Coast (West Africa)	295,000

The three principal markets for raw rubber are New York, Liverpool, and London.

MARGARINE

The bulk of our diet consists of what we may call fuel-foods and building-foods. To the first class belong the different kinds of fats; these burn in the body and produce both heat and power. They are the coal of the human engine. Most of the fat we have been accustomed to eat has been of animal origin, such as the fat of meat,

and that contained in milk, cream, and butter. Fats are of the greatest importance to Northern peoples because they provide warmth but, inasmuch as they also provide power, they are necessary to all people, though all people do not consume the same kind of fat. In the Mediterranean countries the people use olive-oil, a vegetable fat; amongst the Eskimos the fuel-food is blubber; in India it is *ghee*, prepared by melting butter made from cow's or buffalo's milk and then separating the curd and water. In our own country it has long been the fashion to eat butter, an animal fat. But we are now consuming more margarine than butter, and in the preparation of margarine a vegetable fat obtained from various oil-seeds and from the nuts of different kinds of palms is of the greatest importance. That means that we get large supplies of our fuel-food from those hot wet lands where palms flourish.

In Africa there are extensive groves of the well-known oil palm from the Gulf of Guinea to the south of Fernando Po on the west, and along the shores of the Central African lakes. West Africa, broadly speaking, consists of a low forested coastal plain, a wooded upland region, and then a savanna region or grass land which finally passes into desert. It all lies within the Tropics and the temperature is therefore high. The rainfall is heavy: in summer West Africa lies within the region of the south-east trade winds which flow into a low-pressure area over the Sahara and deposit moisture as they pass to the uplands; in winter—that is, when the sun is south of the Equator—it lies within the belt of calms and has local thunderstorms which bring much rain to the coast. Hence West Africa is both hot and wet and so suitable for palms.

The oil palm is usually not found more than 200 miles from the coast and is most productive where the soil is generally moist. The full-grown tree is about 60 feet in height. Unlike the rubber tree it grows very slowly and may not attain its full height for 120 years, though fruit can be gathered from about the fourth to the eighth year and then onwards. The nuts grow in

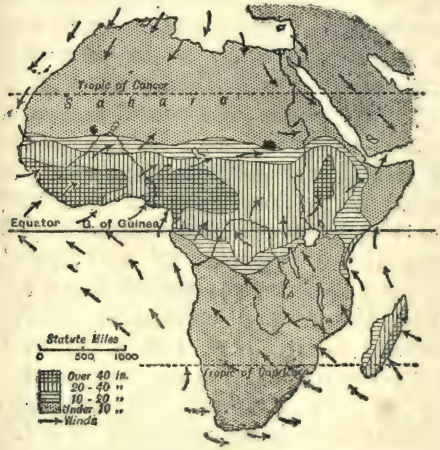

Fig. 42.—Africa: Rainfall, May–October

clusters beneath the long fronds. 'The whole fruit in appearance is something between a pine-apple and a gigantic fir cone with the interstices filled in; and this outer covering contains many "nuts," though the term is not very appropriate, for each resembles a yellow plum more than anything else. The skin is soft and silky and beneath it there lies a mass of fibre and yellow grease. The bushman either scrapes this away or stamps the whole affair up in a foot mortar, and the pulp is boiled; when the grease rises

to the top it is strained off, and becomes the best palm-oil. Then there is still left an inner shell something like a walnut, which is cracked and the two or three little black kernels it contains are flung into another calabash.'[1] These kernels are shipped to Great Britain and the Continent in millions of tons, and are pressed for an oil inferior

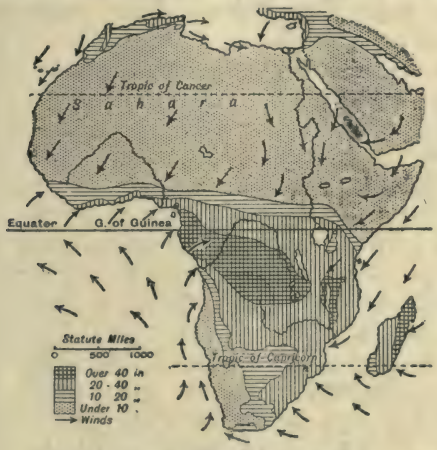

Fig. 43.—Africa: Rainfall, November–April

to that in the outer layer. The chief markets for palm-oil are Liverpool, Hull, and Marseilles.

The coco-nut palm is the most useful tree in the Tropics, and the principal producing countries are Ceylon and the Philippine Islands. Ceylon has a coastal plain and a mountainous centre. It receives rain from both the north-east and the south-west monsoons in turn, and, lying so near the Equator, it has a high temperature all the year round. The coco-nut palm is carefully planted and tended, for it needs a great deal of care to enable it to compete with other forms of native

[1] *In the Niger Country*, H. Bindloss.

Fig. 44.—World: Oil Nuts.

vegetation. The natives express this fact by saying that it cannot grow far from the sound of the human voice. One tree will bear fruit four or five times a year and live from seventy to eighty years.

The ripe coco-nut has thin brown skin, underneath which is a mass of tough brown woody fibre enclosing the kernel, the coco-nut of the greengrocer. The flesh of the nut is the part from which the oil is obtained. The husk is removed by striking the fruit sharply on the pointed end of an iron bar and then giving a dexterous twist. A native can 'hull' 1000 nuts in a day, but this is too slow for the modern manufacturer, so machines have been invented that will strip the husk off 1000 nuts in an hour. The natives get the oil in several ways; sometimes they cut the kernel in small pieces and expose them to the sun, when the oil melts and runs out; at other times they crush the kernels in mortars, put the pulp in perforated wooden vessels in the sun, and collect the oil that drips out. Oil prepared by natives is called *coco-nut* oil.

When the flesh of the nut is dried in strips, either by the sun or in a kiln, the product is known as *copra*. This is exported to Europe in bags, and the oil which is then extracted by much improved processes is known as *copra-oil*. The chief ports that handle copra are Liverpool, Marseilles, and Hamburg.

Coco-nut oil is used not only for the preparation of margarine but also for the production of salad-oil, the 'cream' of many chocolate creams, and for a kind of lard. The demand for coco-nuts for these and many other purposes has doubled the price. About 2,000,000 tons of copra are annually consumed in Europe alone.

The equatorial regions have always been important because they are places where 'things grow.' The great moisture and heat are responsible for a most luxuriant plant life which requires no attention from man in order to flourish. These regions are the homes of many varieties of fruit, timber, spices, and of rubber and tea. At one time they were valued chiefly for the spices that were sent to Europe to render palatable the winter diet of salted meat; then they took on a new importance when tea became a fashion, and to-day they are even more valuable for their rubber and vegetable fats. And these regions must inevitably become more important still, for there vegetation grows at a rate we can scarcely realise, and vegetable products are the bases of all our food and clothing and supply a great part of our other material needs.

Hitherto the equatorial forests have simply run wild. At most a few barbarians have raised crops in temporary clearings, and rubber, oils, tea, cocoa, sago, tapioca, and a few other products are gathered wild or grown on insignificant areas. When the region of these forests is cultivated as the farm lands of the world are cultivated, there will be an enormous increase in available supplies.

And not only will the places become more important: the people who live in the inter-tropical regions will become more important also. We now depend on these peoples whom we think scarcely civilised. But we have seen in the case of wool how the land where the raw material was produced eventually became important itself. It is more than likely that when these warm wet productive regions come to be organised, they and their peoples will count to a far greater extent than they do now.

XVI

FURS, FEATHERS, AND FISH

IT is not only in the forests and on the grass lands of the warmer parts of the earth that men are at work producing things that are used in Britain and elsewhere. The same is true even of the regions north of the Arctic Circle, though in these regions the number of people who work for us and the value of the things they produce are small. Both land and sea, however, contribute to the welfare of the rest of the world.

The northern land area is called the *tundra*; it is a narrow strip of comparative desert surrounding the Arctic Ocean. On the south it passes through stunted copses and sparse woods into the sub-arctic forest described in Chapter I. The winter is too cold and too long for the land to grow much in the way of vegetation and the most valuable products of these regions are of animal origin—furs and feathers. During the summer the surface of the tundra is thawed, producing a swamp upon whose surface flourish mosses, lichens, rushes, some ferns, and a multitude of small but exceedingly beautiful flowering plants. In winter the land is buried beneath a sheet of snow and swept by violent storms.

A raw hide with the hair still on it is called a *pelt*: when the coarser hair has been removed

and the hide cured, it can be kept for a long time without putrefying, and it is then known as a *fur*. The most valuable fur-bearing animals of the cold parts of the world are the sable, seal, beaver, sea-otter, fox, wolf, wild cat, and skunk, but many of these live not so much on the tundra as in the sub-arctic forest. The principal fur-bearing countries are the northern parts of North America, Russia, and Siberia. In North America, for two centuries, the Hudson Bay Company had the sole right to collect furs in the barren lands and the sub-arctic forests of the north of that continent.

The most valuable of the fur-bearing animals, at the present time, is the fur-seal. But so persistently has it been hunted that it is nearly extinct in the waters of the Antarctic Ocean, and even in the Arctic Ocean it is only plentiful in the Bering Sea. In order to prevent the seals on the Pribylof Islands from being completely exterminated, the U.S.A., to whom these islands belong, have given the exclusive right of killing seals to one company and have made certain rules and restrictions under which the killing must take place.

Another valuable fur-bearing animal is the sable, which is found in Siberia and Kamtchatka. Another is the sea-otter, now so rare that good specimens fetch an almost fabulous price.

'The bulk of the fine furs of the world are sold in London, where less than a dozen brokers sort, catalogue, and sell them at public auction. Such sales of general furs take place in January and March, and smaller sales in June and October; but sealskins are sold separately in December. Numerous buyers from Russia, America, and other countries attend these sales, but large consignments of fur skins are also sent direct to other

cities of the Continent, notably Nijni-Novgorod—where perhaps is held the greatest and most interesting of all the fairs of the world—Leipzig, and Irbit, Ishim, and Kiakhta in Siberia. Persian and Astrakhan, ermine and Russian squirrel furs are bought almost exclusively at the Russian fairs, Kiakhta being the great mart for ermine and Chinese furs, Ishim for the Russian squirrel, and Nijni-Novgorod for Persian and Astrakhan.'[1]

As the population of the world increases there arises the possibility that the fur trade will decrease, for many of the fur-bearing animals live in the northern forests and these forests are gradually being cut. There is also the wholesale destruction of the wild animals themselves to be taken into account. This possibility has led to the establishment of fur farms, especially in Canada. The fur of the black fox is so valuable, because so rare, that 10,000,000 dollars have now been invested in fur farming. About the beginning of the century a few people secretly began breeding black foxes in captivity in Prince Edward Island, in the Gulf of St. Lawrence. They discovered that the black fox would not only breed in captivity but that its fur actually improved, and before the world had realised these facts the pioneers of the industry had made their fortunes.

Feathers have long had a value in commerce for stuffing beds and quilts, for ornament and for other purposes. In the Arctic regions clothing is sometimes made of the skins of birds with the feathers worn on the inside. The softest down feathers are supplied by the eider duck, which is plentiful on the eastern and northern sections of the Labrador coast, on the cliffs of Northern Scotland, the Faröe Islands, Nova Zembla, and

[1] *Romance of Commerce*, Newland. (Seeley.)

Spitzbergen. In Norway and Iceland the bird is not killed, as it is in many other places, but is tended for the sake of its eggs and for the down which the female plucks from her breast in order to cover her eggs.

The work of most of the hunters and trappers who procure the skins of the northern animals is so arduous and perilous that no man would undertake it, as a means of getting a living, unless he could 'make it pay.' Furs are of great value, especially in countries with cold winters, because they help to keep in the heat of the body and so prevent the wearer from suffering from the rigour of the winter. But they are still more valuable because they are fashionable; this is a point that needs a little further comment.

When man lived in such a primitive condition that he was not far removed from the beasts, his wants were few and simple. As he advanced to a higher civilisation there came a great change. He did not crave so much for increased quantities of the things he had already got but for better qualities of those things, and for yet other and more varied things in order to satisfy a number of new desires. Take as an example his food. At first he was satisfied with the raw flesh of any animal that he killed. But soon after he had discovered the use of fire he learned to cook and became acquainted with the difference between raw beef and grilled steak. What he now demanded was not more beef but beef better cooked. And when he has got all he needs he tries to obtain, say, strawberries out of season, early peas before most other people can get them, just to 'show off' as it were.

Consider the question of shelter. A small well-built cabin will keep out the cold and the wet and,

so far, it is sufficient for the purpose. But its atmosphere is bad, it is almost necessarily unclean and it has no bathroom. When the occupant is poor he is, perhaps, content with the mere protection from the cold and wind. But as soon as his circumstances improve and his standard of living rises, the dirt, the absence of good air and clean water, make him physically and mentally uncomfortable. As he rises still higher in the social scale he calls out for more house room, and he regards a well-built, well-appointed house as necessary for efficiency. And then, as soon as his house is big enough to satisfy his new and advanced needs, he wants it bigger and more costly to satisfy his craving for distinction.

It is the same with dress. Savage man does not wear much in the nature of clothes except where the climate compels him to defend himself from the weather. With a skin or grass apron he is completely dressed so far as his local customs demand. But even the savage is not satisfied with this; he wants to show off also, so he puts a flower in his hair and a feather in his apron. And as men, and especially women, 'rise in life,' there is an ever-increasing desire either to ornament one's person and dress, artistically or otherwise, or to wear more costly articles of dress.

This craving for distinction is the root of the desire to 'be in the fashion,' and it is a most important fact in economic geography. It is partly the cause of the high price of furs; to wear furs is 'the thing,' and so people will pay far more for them than they are actually worth as clothes.

If the land life of the cold north is limited, there seems no limit to the life in the water. At one time the whale played an important part in the

Fig. 45.—World: Fishing Areas

fisheries of the commerce of the world, and British ships still set out from Dundee, Peterhead, and Hull to seek them in the Antarctic Ocean. Though whale-oil and whalebone are still valuable the whale fishery is no longer of world importance.

The cold waters are, however, of immense value in connection with the fishing industry. Fishing is chiefly carried on in the colder waters of the north and south where the seas are shallow. In Chapter VI. the fishing of the continental shelf of North-West Europe has been described: in Fig. 45 are seen some of the other fishing areas. The banks of Newfoundland are of course shallow, and the Japanese seas are also very productive. Fish, like all living things, need food, and though some of them prey on each other it is obvious that if they could only exist by preying on their own kind there would soon be an end to them. Many fish, or the minuter organisms on which they feed, are largely supported by tiny forms of vegetable life; these are often invisible, singly, to the naked eye though, in large masses, they may discolour wide tracts of the surface of the ocean. To all the tiny organisms of the ocean, whether plant or animal, the name 'plankton' has been given; the word simply means 'that which is drifted.' Amongst the plankton the diatoms are of first importance. These are really minute plants; they are the pastures of the ocean. Now these diatoms are particularly abundant in the Arctic Ocean, and it is partly the presence of this rich source of food in the colder waters that accounts for the abundance of fish in the northern seas. Perhaps it would not be too much to say that if it were not for the plant life of the Arctic Ocean there would be no fish in the North Sea. And it is certainly true that in the sea, as on the

land, all animals directly or indirectly are dependent on vegetable life. Big fish feed on smaller fish, but the smaller fish live on sea plants.

Plant life in the water, like plant life on the land, requires light and food. As little light ever penetrates to the deepest depths of the ocean there are no plants there; light is naturally most abundant near the surface, from which it follows that plants and therefore fish are most abundant in shallow waters. The plankton is drifted about by the currents of water and, as the fish must feed on the plankton, they are bound to follow it wherever the currents may drift it. It is suggested that this is the cause of the migration of the herring, but very little is known with any certainty about this matter.

We see, then, that we are dependent for many of the things which we take for granted, on people in warm lands and cold lands, in wet lands and dry lands, and even on the sea itself. If we think over how many parts of the world have already been referred to, even though we have considered only a few of what we think of as necessaries, we are still further impressed by the extraordinary complexity of human life. We have emphasised the fact that we are dependent on many different people all over the globe, but it must not be forgotten that they are equally dependent on us. We have already seen that for some of the things we get we pay in coal; for others we pay by sending back what we make; and it must not be forgotten that whatever is imported must be paid for by exports.

XVII

THE HOUSE

HE three prime necessaries of life are food, clothing, and shelter. The first two have now been dealt with fairly fully, though we shall have something more to say upon the question of food in the next chapter. The subject of shelter can best be dealt with by considering the house in which we live. To describe at length all the materials used in building and furnishing the many different kinds of houses that shelter mankind in the different parts of the globe, and to discover where all those materials are obtained, would take up far too much of our limited space. We shall have to be content chiefly with our own houses and a limited selection of the things of which it is composed and the articles which it contains.

Building materials vary from locality to locality and from country to country. They are heavy and carriage costs a great deal, so that each builder tends to use what is nearest. One of the earliest and most widely used in all forested countries is wood and this is still common in Norway, Finland, Russia, and Canada, and in the hot wet lands of the Tropics. Though wooden houses are rare in the British Isles wood still plays an important part in the building thereof, as it is the material of window-frames, doors, floors, and beams.

In the forests of Canada and Norway wood is

Fig. 46.—Britain: Coal-fields and Industries

cheaply and easily obtained. Furthermore there are in these countries many rapid streams which

provide cheap power for driving machinery. The result is that these countries have developed an important trade in ready-made doors and window-frames, and it is just possible that in the house you occupy the window-frames may have come from a forest in Europe and the doors from one in America.

But civilised people, in all the older countries, derive the main part of their building material from the crust of the earth itself. The chief building stones are granite, sandstone, and limestone for walls, slate for the roofs and, sometimes, marble for the chimney-pieces. In parts of Wales and of Scotland granite is used for the building not only of houses but for barns and even for pig-styes. On the Pennine moorlands, where stone is common and wood is scarce, stone walls take the place of hedges to divide the fields. In such districts, though the stone is difficult and expensive to quarry it costs little to transport as it is close at hand ; it is, therefore, comparatively cheap. If the stone has to be carried for any considerable distance the expense of carriage is so great that it can only be used in costly buildings. In the wilder mountainous districts where stone is locally used it is often left in a very rough condition, but in the towns, when used in the construction of stately public buildings and offices, the stones are carefully cut to fit, and this working of the stones to fit them together involves much time, labour and skill, and adds materially to the cost of the building.

The only good slates come from North Wales, though inferior qualities are obtained in Cumberland and in parts of Scotland.

In plains and valleys where there is often an abundance of clay the usual building material

is brick; brick-kilns are a common sight in most civilised countries. Large cities like London, Paris, and New York require millions of bricks every year, and as transport is an important part

Fig. 47.—England: Chalk and Limestone Areas

of the cost of such a bulky product, the bricks are either made as near to the cities as possible or, if sent long distances, are frequently conveyed by river or canal. As a rule the brick market is a fairly local one.

Important to the builder are lime, plaster, mortar,

and cement. Lime is obtained by burning chalk or limestone in kilns and is a local industry wherever chalk and limestone are found. In England there are hills of limestone stretching from the North York Moors to the Cotswolds, and of chalk from Flamborough Head to the Chilterns, with breaks at the Humber and the Fens. Then there are also the plateau-like chalk downs of Southern England running from the upper Thames valley to the Hampshire basin and the English Channel. Mortar is a mixture of sand and lime, and cement is a mixture of lime and clay from which the water has been driven off by burning. Immense quantities of lime and cement are produced from the chalk quarries at Grays and Purfleet on the north bank of the Thames, at Greenhithe and Erith on the south side and near to Rochester on the Medway. Portland cement is largely a mixture of lime and Thames mud.

The usual fittings of the house include grates, stoves, and other articles of iron. In order to obtain iron from its ores it has to be heated in a blast-furnace. In the furnace are placed alternate layers of iron ore, coke (made from coal), and limestone. The furnace receives, in the lower part, a blast of hot air which assists the combustion of the coke. The foreign materials in the ore combine with the lime and form a slag. Both molten iron and slag sink to the bottom with the lighter slag floating on top. At regular intervals the molten iron is drawn off and run into moulds as pig-iron or converted immediately into steel.

To smelt 1½ tons of iron ore requires 1 ton of coke and half a ton of limestone. Hence unless all three articles are found close together it rarely ever pays to smelt the ore on the spot. The cost of transport of the other bulky materials

would so increase the expense of production of the iron that it could not be profitably placed upon the market. Coal, iron, and limestone are found closely associated in England, U.S.A., and Germany, and these countries are therefore the greatest producers of iron and steel. In countries like Spain and Sweden, where there is valuable iron ore but little coal, it is found that the ore must be sent to some other country to be smelted. Much Spanish ore goes to the South Wales coal-field and much Swedish ore to the York, Derby, and Nottingham coal-field. The excellence of the Swedish ore renders it specially suitable for the manufacture of hard cutting steel; the presence of quarries of stone suitable for grindstones and of abundant water power led to the localisation of the manufacture of cutlery at Sheffield.

Iron is used for manufacturing widely different kinds of goods according to the coal-field upon or near which it is produced. Where the coal-field is near the sea the iron is employed in steel ship-building, as upon the Tyne, the Tees, the Firth of Clyde, and at Barrow-in-Furness.

The coal-fields which lie inland may, so far as the iron industries are concerned, be divided into two classes:—

(i) Those which find it easy to obtain large supplies of different kinds of raw materials such as cotton and wool. These make textile machinery—cotton machinery in Lancashire and woollen machinery in Yorkshire.

(ii) Those which find it less easy to obtain supplies of bulky raw materials. For instance, most of the small things for the house—nails, grates, fenders, locks, and keys—come from inland coal-fields like that of South Staffordshire. This is far from the sea, so that the transport of bulky

raw materials to it would be expensive. It pays better to make small things in which the labour is worth more than the iron out of which the things are made. It is possible that the grate that roasts our meat may have been made of iron found in Staffordshire, but that the knife with which the joint is carved may have been made in Sheffield from iron obtained from Sweden.

Our windows are filled with glass which is produced by melting silica (sand or flint) with salt and other products at a very high temperature. These high temperatures mean the consumption of large quantities of fuel and these are most easily obtained on a coal-field. The use of salt suggests that glass will be made on such a coal-field as that of South Lancashire which is near to the salt mines of Cheshire, the Northumberland and Durham coal-field which gets supplies of salt from Durham, and in the Black Country (South Staffordshire) which is not far from the salt of Worcestershire. Glass is used in every house; as it is difficult to carry from one place to another, owing to its brittle character, the cost of transport forms a considerable part of the price at which it is sold.

Running through the house are pipes of *lead*, *zinc*, or *iron*, and possibly bell and telephone wires of *copper*.

Lead is an important mineral in U.S.A., Spain, Germany, Mexico, Australia, and Great Britain. Tin and lead are found in long veins in granite; copper is found in veins in slate. Hence these minerals are obtained in districts like Cornwall, Devonshire, the Lake District, Wales, and Scotland where such rocks are common. But the greatest amount of tin comes from the Straits Settlements. The copper mines of the British

Isles are gradually being worked out and the greater part of the copper smelted in our islands (chiefly at Swansea) comes from abroad. Belgium produces nearly 40 per cent. of the world's zinc and the U.S.A. about 25 per cent. In the British Isles zinc is found in the same districts as copper and lead. Its chief use is for galvanising sheets of iron to prevent rusting, and in this form it is found in gutter-spouts and water-pipes. When zinc is alloyed with copper it gives *brass* for door-handles, knockers, and knobs, and in the form of *zinc-white* it is an important ingredient of white paint.

The drain-pipes, sewer-pipes, and chimney-pots are probably of earthenware, made from the coarse clays of North Staffordshire, in the district known as ' The Potteries.'

When the house has been built, fitted, and painted, it is ready for occupation ; it must now be furnished. The greater part of what we call *furniture* is made of wood. The hard woods like mahogany, ebony, and rosewood come from the hot forests ; the softer woods like deal and pine are the products of the temperate forests. A tree takes a long time to grow and a short time to be destroyed, and in many parts of the world where forest areas have been carelessly cut and little replanting has been carried out, the land has been converted into desert.

On the continent of Europe, in Germany, Austria, Switzerland, and France, forests are properly cultivated and schools of forestry have been established. In this way care is taken that there shall be an adequate supply of wood for future generations.

Furniture-making calls for much skill, and the cost of a piece of good furniture is often much

more that of the labour employed in making it than of the raw material itself. Though the cheapest forms are made in bulk, by machinery, there is always a demand for better work and for the services of the skilled cabinet-maker. The industry is therefore widely distributed and there is no town of any size that does not possess local craftsmen ; in large cities, where there is a steady demand for furniture, cabinet-making is an important occupation. Articles like cheap chairs and doors, which can be turned out by machinery in hundreds, are, however, frequently made in the neighbourhood where the timber is grown, especially if water power be accessible. Austrian forests and Austrian streams were, for instance, before the war, responsible for the 'bentwood' furniture that was once so common. At home, the chair-making industry of High Wycombe depends upon timber obtained in the local beech-woods.

Upon the floor of the house are *carpets* and *linoleum*. Carpets were originally made at Axminster, Kidderminster, Wilton, and Brussels, and different kinds are still called by these names. They are also made in Asia Minor and in different parts of India. Linoleum is a mixture of cork dust and mineral colouring matter, ground with oxidised linseed oil to a stiff paste and put on a canvas backing. The chief British centre of this industry is at Kirkcaldy in Fifeshire ; the raw material is obtained from the bark of the cork-oak, a product of Spain, and linseed is imported from India and the United States. Linseed oil is also used in paint.

At the windows are *curtains*. These are of cotton or linen. As they are loosely woven, they do not need the damp atmosphere that is so necessary in the manufacture of fine cotton.

Hence this branch of the cotton industry can be carried on in a drier climate as at Nottingham.

Cooking utensils are of iron, copper, and aluminium and do not call for further mention.

Crockery and *china* are made of clay. As they require plenty of coal they are manufactured on a coal-field, the one found in North Staffordshire. The china clay of this district has long been worked out and the supplies of raw material now come from Cornwall; china clay is disintegrated granite. In the fact that china is still made where china clay has ceased to be obtainable we have another illustration of how an industry, like a market, when once established in a particular place, tends to remain there, even when the reasons for its localisation have disappeared. Other places where china is manufactured are indicated in the names of such well-known varieties as 'Worcester china' and 'Crown Derby.' Fine china is also made in Sèvres, Limoges, and Dresden.

But even this is not by any means the whole story, for it would be easy to add to this list many other things necessary for the fitting of a house, and every one of these materials has taken the labour of many men to prepare and transport. Let us take, for example, the comparatively small matter of the furniture of a house. One may go to a furniture shop and buy all that is necessary, but before the furniture arrived at the shop a great deal must have happened, as we should see if we visited the district of Shoreditch in London. There though we should see only the general term 'cabinet-maker' on the windows of some of the little factories, we should see on others 'bedroom furniture' or 'office and library furniture,' and we should soon realise that furniture of different kinds is made by different people. But we should

also see 'chair manufacturer,' 'bookcases,' 'bureau and bureau bookcases,' 'dining-table maker,' 'wood bedsteads,' 'fancy table and palm-stand manufacturer,' 'music stools,' 'coal-vase maker,' 'overmantel maker,' 'Swedish bentwood' or 'Sheraton and Louis,' to show that particular articles are specialised in. 'Upholsterer' or 'frame maker and upholsterer,' or 'cane chairs' or 'folding-chair maker,' on other windows suggest that only particular kinds of chairs are made in each factory. 'Looking-glass manufacturer,' 'plate-glass merchant,' 'glass cutter,' and 'silvering and bevelling done here' bring home to us still further the idea of specialisation. But just when we are beginning to think that we have realised how very complicated the whole business is, we catch sight of 'chair webs and springs' in one shop, and 'moulders and turners' in another, the window of which is full of sets of chair legs and similar sets of parts of articles of furniture. Following successively are 'tissues and cretonnes,' 'hand and panel planing,' 'hard and soft wood and three-ply,' 'steel fittings for wood bedsteads,' 'wood carvings,' 'veneer merchant,' 'marquetry cutter,' 'fret cutter' on shops given up to the provision of the articles or materials mentioned. And 'french polishers,' 'importers of foreign hard woods,' 'machine-tool merchant,' 'saw maker,' and 'wood-carvers' machinery' on others would impress on us still further the enormous numbers of people who work to supply the furniture of even one house. We could study other industries and see they are equally complicated, but enough has been said to show that even the simplest home cannot be built and equipped without the co-operation of a large number of different people both at home and abroad.

XVIII

THE BREAKFAST TABLE

IT must be quite evident by now that we are dependent upon an almost unbelievable number of people for all the articles of food and drink we consume, for all the articles of clothing that we wear, and for all the articles required for the building and furnishing of the houses in which we live. And yet the story is not nearly all told. There are thousands more in many quarters of the globe, ministering by their toil to make life easier for us than it could possibly be without their assistance. To return to the matter of food, think for a moment of the things that appear daily, or from time to time, upon the breakfast table.

We have already told the geographical story of some of them—bread, milk, tea, margarine, fish, and meat; but there may be other things —bacon, butter, cheese, eggs, sugar, coffee, and cocoa—of which we have, as yet, said nothing and to which we have but little space to devote.

Bacon.—Cattle and sheep are the chief meat animals of the grass-growing lands; pigs are the chief meat animals of the grain-growing lands. Pigs were, originally, found in forest countries where they lived on acorns, nuts, and similar foods. These are highly nutritious and do not need to be consumed in such large quantities as

grass; the pig has a much smaller stomach than the sheep and cannot, in its domesticated state, be fed upon grass. The nuts of the forest were, also, full of oily contents which were converted into a layer of fat that helped the pig to withstand both the cold and the hunger of the winter season. Now grain, especially maize, supplies to the domesticated pig just that kind of food—nutritious, highly concentrated, and fat producing—which is suited to the small stomach and fatty character of the original pigs. The pig is, all the same, a big feeder and requires plenty of food whether it be acorns or grain, and so is found in largest numbers either in forest regions or where there is an abundance of cheap grain.

The 'corn belt' of the U.S.A. has one-third of the total number of pigs in the world; the countries of the Danube come second. But 'largest number' does not necessarily mean, and in these cases certainly does not mean, 'best quality,' and in Canada, Denmark, and North Germany, though the number of pigs is fewer than in the maize lands of the States, the quality is better; the best quality of all comes from our own islands. Wiltshire and Westmoreland bacon, Yorkshire and Cumberland hams are famous everywhere.

The chief pig-producing countries are U.S.A., Austria, Hungary, Germany, Canada, Russia, and Denmark. The British Isles produce about as much as they import. They buy practically all the bacon and ham that Denmark has to spare (valued at £16,000,000 in 1912) and obtain most of the rest from North America.

Dairy Produce.—We have already spoken of milk, but butter and cheese are made from milk when it cannot be used in the liquid form. All

Fig. 48.—World: Maize and Pigs

civilised countries make butter and cheese, but some are more specially noted for the excellence of their produce than others. As the cattle countries are grass lands we might expect to look for our sources of supply chiefly to grass-growing countries like North America, Australia, and the Argentine. But there is something else to be taken into account. If a farmer wishes to increase his income he may, according to circumstances, take more land or get more out of the land he already possesses. In such areas as the Great Plains of North America and the Argentine there are millions of cows, but the farms are so large and so remote from centres of population that dairy milking is impossible and, even if it were possible, it would be unprofitable, so the cows are allowed to wander about with their calves and the calves get the milk; in such areas beef is raised.

But where the farms are near centres of population, and therefore almost necessarily small, the farmers cannot raise enough cattle to make a living if they follow the methods of the man upon the ranch. Instead, they keep a few cows, feed them with hay, grain, cake, or other form of rich food, and produce milk, butter, and cheese in sufficient quantities to give a good income.

Wherever we find large exports of dairy produce, as from Denmark (Danish butter), Holland (Dutch cheese), and Switzerland (Swiss milk), we can conclude that, as a rule, the agricultural opportunities open to man are limited and that he has therefore been compelled to make the most of those that he possesses. So we must add to wide grassy lands, as possible butter and cheese lands, smaller countries like those above mentioned with dense populations and small farms.

Fig. 49.—World: Sugar

Cane Sugar is grown in warm lands near the sea; Beet Sugar in colder lands

Denmark was once one of the poorest countries of Europe, but by hard continuous labour, scientific agriculture, and co-operative farming, this land has become the second richest per head of population. She has 70,000 farms of 100 acres or over and 150,000 of from 7 to 10 acres only, and she sends annually to Britain alone butter worth £10,000,000. Danish butter is also packed in sealed tins and sent for consumption in countries as far away as India and China. The port of export is Copenhagen, the capital and the one and only large city in the country.

Eggs.—In 1911 the value of the eggs produced in the U.S.A. was greater than that of all her coal and iron put together, and greater than that of the whole world's production of gold, silver, and diamonds. But because the lowly hen is kept so widely, and eggs are often collected on such a small scale, the importance of the egg trade generally escapes attention. It is difficult to guess what is the value of the home supply of the British Isles; it is known, however, that the value of our average annual import is about £7,000,000, and it is probable that the home production is at any rate equal to this.

The best poultry-rearing and egg-producing countries are those where grain is plentiful and the climate is dry as, for instance, Russia and Austria. Just as in the case of other kinds of farming, as soon as man begins to think of profit he calls in the aid of the scientist and the machine; in this case use is made of a mechanical incubator which hatches chicks out on a large scale and sets the mother hen free to devote all her time and energy to egg-laying.

Sugar, coffee, and cocoa take us back to the hot lands of the earth.

Sugar is made from the juice or sap of some plants. Formerly almost the only plant in use for the manufacture of sugar on a large scale was the sugar cane. This contains in its fibrous woody stem a large quantity of sweet sap. It grows to a height of about 12 feet in lands where the temperature never falls below 70° F. and where the rainfall is at least 25 inches per annum—that is, it grows within the Tropics.

When the canes are ripe they are cut down at the base; the upper parts of the stem are replanted, but the lower parts are crushed in a mill and the juice extracted. The juice is placed in large shallow pans and boiled until the liquid in the pan becomes thick and sticky. The pans are then set aside to cool and part of the sugar crystallises out as raw or moist sugar; this is sent away to be refined. A part of the sap still remains liquid and forms treacle or molasses.

The hot wet regions which are most suitable for sugar are the East and West Indies, Guiana, Brazil, India, China, Mauritius, Natal, Egypt, and Queensland. The cane is a native of South-East Asia but was introduced into the New World by the Spaniards; they had learned sugar-planting from the Moors. Under the Spaniards and their white successors in the West Indies the cane was cultivated by slave labour, and when slavery was abolished in 1833, production was seriously handicapped. Life is easy in the tropics; a few days' labour will earn enough to satisfy a man's simple wants for a week or more, so the negro refused to work regularly and the sugar plantations suffered.

During the wars with Napoleon, the ships of both France and England were constantly raided, and the supply of cane sugar, as of all sea-borne commodities, was thereby diminished. The lack

of sugar turned the attention of the scientist to other possible sources of supply, and experiments were made with the sap of a special kind of beet. The experiments were so successful, and the sugar-beet grows so well in Europe, that to-day more than two-thirds of the world's total supply of sugar comes from beet. The chief beet-sugar producing countries are Germany, Russia, Austria, and France.

Coffee is the seeds of a shrub, a native of Arabia and Abyssinia. The fruit resembles a cherry and each contains two coffee berries. There are two important kinds of coffee—(i) Liberian, a lowland plant which does best at a height of from 1000 to 1200 feet; and (ii) Arabian, which is a mountainous plant and flourishes at a height of 3000 to 4000 feet. The coffee plant has a long root and prefers rocky ground especially when the holes and the cracks are filled with decayed vegetable matter. It needs great heat and moisture, but, at the same time, it requires protection from too heavy rains and from very strong winds. All these conditions are found within the Tropics on the sides of the forest-clad mountains.

Brazil grows sufficient coffee to supply the whole world. At one time coffee was the chief product of Ceylon, but in 1869 the plants were destroyed by a fungus and the planters took up tea in its place.

Cocoa (or *cacao*) is made from the seeds of a plant which is a native of the West Indies and of tropical America. It thrives where there is great heat and moisture and fertile volcanic alluvium. The fruit contains a large number of seeds which are produced in a greenish or reddish pod, three or four inches long. The fruit is heavy and is attached in clusters to the trunk and larger

branches of the tree. The hurricanes which are common in the region where cocoa is grown would, if not prevented, beat the young buds from the tree before they were ripe. To avoid this danger the plantations are placed in areas sheltered from boisterous winds.

Cocoa was unknown to Europe before the days of Columbus but to-day it is found in many parts of the world—Ceylon, Liberia, Madagascar, Mauritius, tropical Australia, the Philippine Islands —that have the same kind of hot wet climate. The cultivation of cocoa is not so tiring as that of sugar, for the plants are grown under the shade of other plants. These plants shelter both the cocoa and the labourers from too excessive heat. The most usual shade plants are now bananas and rubber, both of which are in demand in civilised countries. Cocoa in Spain takes the place of coffee in France and tea in England as a national breakfast or non-alcoholic beverage.

There was a time when the ordinary breakfast of the English man, woman, and child was chiefly bread and meat and ale or mead, the cheapest and most abundant products of the motherland. But as the world was opened up by explorers, things like tea, coffee, cocoa, and sugar appeared upon the table, and we now regard these things as necessaries. We owe a great deal to the men who added these articles to vary our monotonous menus, and we owe still more to those thousands of our darker brethren who work in a damp broiling heat to provide the ever-increasing supplies that the ever-increasing population of the world considers it could not do without.

XIX

LUXURIES

IT is a common habit to speak of certain things as 'necessaries' and of certain other things as 'luxuries,' and we have already seen the importance of luxuries in economic geography, but it is not always easy to say whether any given thing is a luxury or a necessity without taking a number of facts into consideration. A bathroom is a luxury to a person who has lived in a house without one, but it is a necessity to the man who has been accustomed to such a convenience all his life.

Now most of the things about which we have already spoken would be included amongst the necessaries of life except that furs, and rubber for the tyres of pleasure vehicles, are perhaps luxuries. And it will be noticed that most of the necessaries are of animal or vegetable origin and that the latter, with the exception of the plants grown in Britain, come mostly from the less settled parts of the earth—grass lands and forests. Further, these things are, in the main, raw materials, produced by farmers and worked up by skilled workmen in Britain.

Most of the luxuries are earth products also—fruit, wine, and tobacco—though the last two require treatment by man before they are fit for consumption, and fruit certainly lies close to the

border line between things necessary and things that are mere luxuries.

Wine.—The vine is a hill plant and flourishes best on dry sunny slopes. The vines are planted in regular rows and grow to a height of about five feet. In the summer the leaves are of a dull green, and at such a time the vineyard is not particularly picturesque, but in the autumn, with

Fig. 50.—France: Relief and Vine

the turning of the leaves, the hillsides are ablaze with orange and crimson, amber and gold.

France produces much more than one-third of the wine of the world. Champagne is made in the valley of the Marne, a tributary of the Seine. Fine grapes are grown on the dry chalky soil, and the bottled wine is stored in great cool limestone caverns. Claret is made from red grapes in the valley of the Garonne and exported from Bordeaux. Burgundy is made on the sides of the

Côte d'Or, the 'Golden Slope.' The name is an appropriate one, for the vineyards of this district have been the foundation of many large fortunes.

Vintage time in France (more so in olden times) is a very merry season. Everybody, old and young, goes to the vineyards to gather grapes. The fruit is transferred from smaller to larger baskets and thence taken to casks where it is crushed down with a wooden mallet. Finally the mass of juice and fruit is placed in a winepress or trodden out by the feet of the men who dance upon it while the onlookers join one another in merry song. The juice is collected in vats, fermented, and then stored for use.

Italy produces nearly a quarter of the world's wine (Chianti, Capri, and Marsala) and the Iberian peninsula about one-fifth. Portugal exports port wine from the port of Oporto where there are huge warehouses, one of which has a storage capacity of 6,000,000 gallons. Sherry, a Spanish wine, derives its name from a town formerly called Sherish (now known as Jeres).

The vine was unknown in South Africa, America, or Australia before it was taken there by white settlers. Now wine is successfully produced in all these countries; the wines are excellent and much cheaper than European wines of equal quality.

Fruit has a wide range according to its nature —bananas and pine-apples within the Tropics: grapes, lemons, oranges, olives, figs, peaches, apricots in the south of Europe; apples, pears, plums, cherries, strawberries, gooseberries in cooler northern latitudes. Within the Tropics fruit is really one of the necessaries of life, for it forms a considerable part of the daily diet, but in cooler lands it is more often a luxury, especially when

supplies fail to meet the demand, and rising prices confine the commodity to the rich.

The perishable nature of fruit prevented its transmission over long distances before the invention of the refrigerating chamber. It is now possible to send it all over the world, though some very delicate fruits like the mangosteen—a tiny snowball set in a casket of crimson—are still unknown in Europe.

Hundreds of thousands of acres of apples, pears, and tomatoes are grown for export in Canada, Australia, and New Zealand. California, with a climate like that of the Mediterranean, sends its tinned peaches, apricots, and pine-apples abroad by the million.

Oranges are natives of Asia but were brought to Europe by the Portuguese some 300 years ago. The orange grows all along the shores of the Mediterranean wherever the climate is at once mild and moist. Most of our thick-skinned oranges come from Portugal, but those used in the making of marmalade come chiefly from the neighbourhood of Seville in Spain. There are orange groves along the shores of the Riviera, in Southern Italy and, along with lemon groves, in Sicily, but even the Rhône valley and Lombardy are too cold. Along the coasts of Southern Greece, South-West Asia Minor and Palestine, oranges grow wherever the land is low. The orange is now also grown in the West Indies, California, Florida, and Australia.

Apples from Tasmania and New Zealand—countries with climates something like our own but on the opposite side of the world—begin to arrive here about the time when our home-grown supplies are exhausted.

The chief source of bananas is the West Indies ;

special lines of fast steamers bring us annually several millions of this fruit from Jamaica. They are unloaded at Avonmouth, the outport of Bristol. The success of the banana is doing something to compensate the West Indian planters for the loss of the sugar market.

Other fruits include dates from hot dry lands like Arabia and the Barbary States, and figs from Southern Europe, North Africa, and Asia Minor.

Raisins, sultanas, and currants are merely dried

Fig. 51.—Orange-growing Districts

Notice that the orange is grown along the shores of the Mediterranean

grapes. Raisins come from Valencia and Malaga in Spain, sultanas from Smyrna, and currants are exported from Corinth (hence their name in Greece.

Tobacco is the dried leaf of a plant which grows both in warm and in hot climates. It does best with heat and moisture and prefers a soil rich in lime and decayed vegetable matter. The finest cigar tobacco of all grows in the neighbourhood of Havana in Cuba. The word ' Havana ' is no one's particular trade-mark and is used by all tobacco growers in the island of Cuba whether near to Havana or not. The finest leaf grows

only in one particular district, a district so small that the supply of tobacco from it is very limited

Fig. 52.—Northern Hemisphere: Mediterranean Climate

and the cigars from this tobacco fetch exceedingly high prices.

On the coastal plain of North America, from Chesapeake Bay southwards, especially in the high parts at the south-east of the Alleghany Mountains, in the upper Garonne and in the upper Danube the tobacco there grown is more suitable for the pipe, while on the coastlands of Syria and Anatolia,

in the delta of the Nile, and in the state of Virginia (U.S.A.) the tobacco is more suitable for cigarettes.

It is quite natural that these luxuries very largely come from lands round the Mediterranean

Fig. 53.—Southern Hemisphere: Mediterranean Climate

and from other lands with similar climatic conditions. Though some fruits ripen under continuous heat and moisture and others, like the date, grow where no rain falls, yet the regions with a wet winter and dryish summer (Figs. 52 and 53) are best suited to the growth and ripen-

ing of fruit. The temperature of those regions happens to be warm but not hot.

Besides the luxuries of which we have spoken there is another type: such things as watches (almost a necessary now), jewellery, and pictures owe their value almost entirely to the labour spent in their fashioning. What we buy when we purchase a watch is not so much steel or glass, or even silver or gold, as *skill.* The raw material of a silver watch would not, of itself, be worth more than a few shillings; the finished article, if well made, may be worth a few pounds.

It has already been pointed out that one can buy and sell not only raw materials and manufactured goods but also customs and habits. To this list of saleable commodities we may now add skill and *artistic taste.*

Skill can be applied not only to the making of pictures or the making of watches, but also in connection with the ordinary necessities of everyday life. For instance, it is possible to purchase two suits of clothes of exactly the same quality of cloth in one of which the wearer looks well-dressed while in the other he might present a ludicrous appearance. One of the suits is the work of a tailor with taste and skill and will be much more expensive than the other which is ill-fitting and badly made. The wearer might pay, in each case, the same price for the cloth and the buttons, but in one of them he would pay for ability and artistic talent as well. It is the same with tables and chairs and all the other things that men use; they can be artistic as well as useful, but the more skill and taste displayed in their manufacture and design, the more expensive they are likely to be.

Perhaps the most artistic people in the world are the French, and it is interesting to examine

the following table of the most important French exports to us in 1911:—

Silk broadstuffs	£3,986,000
Woollen manufactures	3,346,000
Motors	2,492,000
Wine	2,231,000
Fruit	1,266,000
Cotton lace	986,000

Among the other exports are:—

Artificial flowers	£647,000
Gloves	564,000

Wine and fruit we have already spoken of. In regard to the production of silk, France possesses an advantage in that mulberry trees on which the silkworms feed grow easily in the north of the Mediterranean but not easily in England. To the second article on the list we shall return presently. The others indicate that the exports of France are not raw materials but things that require skill and artistic sense, the two things for which the French are famous all the world over.

Similarly a table of Swiss exports includes such things as watches, wood-carving, embroideries, and morocco leather (from goats), which contain much skill but little raw material. This form of industry is forced on the Swiss by the lack of mineral wealth and the poverty of the soil. On the other hand Switzerland gains much, from a manufacturing point of view, by the force and abundance of her water power and the splendid education and thrifty character of her people. The falling water produces electricity which supplies power that can be used in the cottages of the workpeople and, though manufactures are important,

there are none of those smoke-begrimed industrial cities which are such eyesores in our own land.

In the table of French exports on page 205 there is one that needs a little explanation, and that is *woollen manufactures*. We ourselves make quite large quantities of woollen stuffs for export to other countries, including France, and yet here we are importing over three million pounds' worth from France. If we have enough woollen goods to be able to send them abroad, why do we bother to import any from across the Channel? What we might expect from the study of the other French exports. The woollen stuffs we buy from the French are such as exhibit skill and artistic ability of a high order, and it is not so much the wool of France as the particular talent of the French that we are paying for. And the skill is not only mechanical. Partly as a result of French climate, but partly also as a result of French skill, French lands are probably better cultivated than ours ever were except in a few areas. Frenchmen do not require to import so many things as we do: they can raise almost enough wheat for themselves. The silk and wines are, equally with the woollens and gloves, products of French skill. Of course we English folk are a very clever and splendid people; we should be poor Englishmen if we were not thoroughly convinced of that fact. Many of the things which we export are just those that exhibit skill. But it is worth while to be sane enough to realise that we do not possess all the skill and sense in the world, and that some other peoples can make some other things better or cheaper than we can.

XX

POWER

THERE was once a time when man had to perform all his tasks unaided by any other form of power than that supplied by his own muscles. His own human strength provided the force that lifted everything he wanted to lift and moved everything he wanted to move, and no more work could be accomplished than that which could be accomplished by the unaided strength of a few individuals. Later, he learned to use the power of the wind or of running water to drive a mill, but the mill remained for centuries the only instrument that could do more work than could be done by man alone. While these conditions lasted there was little that we should now call commerce; towns and ports were small in size and changed but little in character from one generation to another.

'Through all the centuries men were born and died in a world which was entirely dependent on agriculture and pastoral pursuits, a world in which the physically strong man counted for a great deal, because by the strength of his muscles he could do more than could be done not only by any one else but by any other means.'[1] Little more than a century ago there came a great change. 'Coal, which up till then had been used here and there

[1] *Geography and World Power*, Fairgrieve.

merely for domestic purposes came to be used to drive machines which would do far more work than the individual man or animal, or even a number of men or animals could do. Man harnessed energy outside himself to do the things which before then he had to do himself with his own hands. Here was a tremendous store of energy, by which things could be done which could not be done before.' [1]

Thus man saved his strength and, at the same time, got more done. And the great importance of this lies in the fact that such skill and strength as he possessed could now be applied to a finer type of work. Perhaps we are only at the beginning of what man's energies are capable of performing when relieved from the strain of heavy mechanical work. Some day all the really heavy work of the world may be done almost entirely by machinery, and man will be set entirely free to devote his energies to tasks of a kind of which we have not yet begun to dream. Every extension of the use of mechanical power makes for freedom in the exercise of human skill and intellect.

To-day the chief source of power is *coal*. It has been calculated that the coal used in our factories alone does as much work as 175,000,000 strong hard-working men could perform. The value of coal is a British discovery and, for a long time, we led the world as a manufacturing nation, without a single serious rival. But France, Germany, and Poland all possess coal which lies in a belt that runs through Europe along the line where the northern plains meet the belt of plateaus to the south of them, while there are also extensive coal-fields in Russia. And in each of

[1] *Geography and World Power*, Fairgrieve.

the above areas more or less use has been made of steam power according to the enterprise and opportunities of its inhabitants.

It has, then, mattered a great deal where sources of this power were available, not only for the commerce and industry of the world but for the well-being of man.

In France the coal is found chiefly in the north-east, where the coal belt bends round and crosses the Strait of Dover to connect with the Kentish coal-field that is now being partly worked. There is coal in France also in the southern highlands but the amount is not great, and France is an agricultural and not a manufacturing country.

The German coal-fields are larger and more important, though they suffer one disadvantage in being far from the sea. The chief German coal-fields are the Westphalian in the basin of the Rhine, the Saxon in the basin of the Elbe, and the Silesian coal-field in the basin of the Oder. There are extensive coal-fields round Lodz, south of Moscow and north of the Sea of Azov, but they have been comparatively little worked.

China and India possess extensive coal-fields but have not made use of them in the way that the countries of Western Europe have done; when these coal-fields are developed there will be serious changes in the distribution of international commerce. The Chinese coal-fields are rapidly becoming of importance, and Chinese coal has even been exported to Europe.

Of the rest of the coal supplies of the globe only those of North America need be mentioned. In that continent are gathered close upon half the available coal supplies of the world. Most of the mines lie in the eastern half of the continent; there are a few in the centre, but the Pacific coast lacks

good and plentiful supplies, and manufacturers in that region were seriously handicapped until 1901 when petroleum was discovered.

The mention of petroleum in the last paragraph brings us to another source of power—*oil*. Petroleum was formed by the decomposition of animal and vegetable matter deep down in the earth, shut off from the atmosphere by heavy layers of rock. About half the world's supply is obtained from the U.S.A., and a little less than half from Russia. Smaller quantities are obtained from Austria, Rumania, India, Japan, Canada, Germany, Burma, and Sumatra; borings are being made in England in the belief that we too have supplies that are worth the working.

Petroleum was originally used as a source of light, then as a means of lubrication, and finally as a most valuable form of power. First came the engine run by gasolene, one of the by-products obtained during the refining of the crude oil; this was followed by the burning of crude oil itself under the boilers for the production of steam. This use of oil has great advantages over the use of coal in steamers, for oil tanks take up less space than coal bunkers and the oil will flow from tank to furnace, whereas coal must be passed along by hand; there is economy both of space and labour. In America where oil has been plentiful and cheap it rapidly came into general use, and now it drives the locomotives over 17,000 miles of railway.

The coal belt of Europe then has been, is, and will be of very great importance, while the importance of the United States is also very largely bound up with the availability of coal and oil. Those lands where coal and oil are present but not yet exploited must increase in importance.

Things can be made in them in far greater amounts than elsewhere. But two things must be remembered. First, the trouble about both coal and oil is that they are *capital* and not income and that the supplies are running out. There is less and less of our capital left. The world is really growing poorer by the use of coal. And, secondly, the farmer still remains the producer. What we get from him is interest not capital.

The increasing cost of coal and oil, due to increasing scarcity, is leading men to look for other sources of power. Great power schemes for utilising *water* are being developed. We are beginning to realise that in allowing so much of the water power of the world to run to waste, we are squandering income which must be used immediately it is forthcoming or it is lost for ever. Unfortunately, despite much wild newspaper talk, our own country possesses very little available water power. In order that water may be successfully employed as a source of power there must be volume enough and fall enough to turn heavy wheels and, more important still, the flow must be constant or the wheels may not go round and the machinery not work. The high rainy regions of the world are naturally those where most water power may be used. In any land where periods of drought succeed periods of rainfall there would certainly be such a failure of water at certain seasons of the year that the machinery would of necessity have to lie idle and the workpeople remain unemployed.

In the early days of settlement in America water power was of great importance; oil and coal were not in use. Water ground the flour and sawed the lumber from the forest. To-day water is more used than ever; by the power it generates

Fig. 54.—World: Seas where Tides are highest

cities are lighted, street cars are run, and factories are worked miles away from the place where the torrents are situated. Niagara Falls, if fully utilised, would develop about 7,000,000 horse-power day and night throughout the year. Coal and oil will both be exhausted some day, and may easily become too dear to be used even before they are exhausted; water will continue to flow and remain cheap as long as life itself. The mountainous areas in the ever-raining equatorial regions must then count for more than they do now.

Another source of power is *alcohol* made from plants. Regions where plants with plenty of sap grow must become of importance. When speaking of rubber we have seen that the lowlands on either side of the Equator produce enormous amounts of quickly growing vegetation, so that here is an enormous supply of material from which alcohol may be made. The rainy regions where the westerly winds blow do not produce nearly so much vegetation owing to the lack of heat. It is curious that it is again the equatorial regions which are indicated as sources of power.

Then there is the *wind*. Much can be done by means of windmills. Even now much of the low-lying area in Holland is drained by wind power.

Occasionally men speculate upon the possibility of making use of the energy of the *tides*. The rise and fall of the tide is considerable in a few of the regions of the world where the seas are shallow. The British seas are shallow and the tides are more marked than in most seas on the globe. Tides have been of use in keeping estuaries clear of mud and in carrying ships far inland, but the great difficulty is that so far no one has suggested how to use the power of the tides directly in such a

fashion as to give an adequate return for the capital that would have to be expended. Most extensive and costly plant would probably be required; it would be necessary to shut the water off at the time of high tide and then let it run out in the form of waterfalls at low tide. The machinery would require attention at all hours of the day and night, and this would mean a very heavy bill for labour. It might be possible to use the tides but, so far as we can see at present, neither wind power nor tide power would pay except in exceptional cases, for it is only close to certain lands that tides rise to any height.

Perhaps some day a method will be found of harnessing the energy which the *sun* is pouring down hourly upon some part or other of the surface of the earth. It might be possible to go to some of the cloudless spaces of the earth, such as the Sahara desert, and there to erect machinery which would enable the world to draw its necessary supplies of power immediately from the sun. 'Here, on to an area comparable with that occupied by Greater London, is yearly directed as much solar energy as could be produced on complete combustion of the total amount of coal annually raised in Britain.' [1]

We have not mentioned *electricity* as a source of power, for it is but some other form of power transformed and it has this disadvantage that some part of the power, however produced, is always lost in transmission.

But these substitutes for coal cannot be used at once, and this chapter will have missed its main purpose if it has not taught the necessity of conserving and not wasting power. The whole of the immediate future of the world, as far as

[1] *Geography and World Power*, Fairgrieve.

we can see at present, depends on coal. There is nothing which could replace it except oil and the amount of oil is probably more limited than that of coal. Without coal our ships would be reduced to the use of sails again and the vast populations of the present would become impossible ; we must economise.

We shall have to be careful in working the mines to get out all the coal and not to leave the seams which are difficult to work. We have to study and apply the proper methods of consuming coal.

We shall have to use gas rather than coal to heat our boilers, and coke in our houses, or perhaps we may get power, heat, and light by wire from generating stations at which electrical plant is driven by fuel, solid or spirituous, representing only the residue of the mineral after much chemical wealth in benzol, paraffin, etc., has been extracted.

And when the world has been brought to act as one for the common good of all instead of for the selfish interests of separate parts, we shall take common action for the conservation of the resources of the world as a whole.

Saving power means the employment of skill, and skill is becoming of more and more account in saving. We might almost define ' economics ' as the ' science of saving ' ; by saving we do not mean hoarding, but rather spending so wisely that we get the best possible return for the power expended. Lands where saving in this sense is carried out must be important commercially.

XXI

MANUFACTURES

IN the preceding chapters we have pointed out again and again how we depend on the grass lands for certain useful or necessary products —sheep, wool, cattle, hides, and wheat; on the warm damp lands for other useful and necessary products—cotton, tea; on the equatorial lands for rubber and margarine; and on the polar lands for furs and, indirectly, for fish. The whole globe contributes raw material for our support and comfort.

Then, too, we have taken more than a mere passing glance at certain British industries such as coal mining and the manufacture of cotton and wool. And, further, we have drawn attention to the fact that power varies in kind and abundance from country to country and that habits, skill, and artistic talent are just as saleable as sugar or beef. The differences in production of different countries leads to interchange of what is made, *i.e.* to trade.

Britain and France are two countries typical of lands in those cooler regions that lie in what are sometimes badly called the 'temperate zones.' The really temperate areas are shown in Fig. 55.

Consider the continent of Europe. Here the climate is such that, over the greater part of it, it is possible for man to work all the year through, and though some people, mistakenly, regard work

as anything but a blessing, it is as certain as anything can be that work is an advantage both to the individual and to the nation to which that individual belongs. And the only people who have played a really great part in the life of the world, as a whole, are those who have lived in regions where the conditions are such that work was always possible.

It is true that in Southern Russia it is sometimes too hot to work at midday and that in Northern Russia the extreme cold of winter occasionally puts a stop to outdoor labour. Still, on the whole, in most parts of the Continent man can work out of doors from January to December. The temperature conditions vary in different parts of the Continent, but we can say, roughly, that in the south it is warm, in the west cool and equable, and in the east, owing to the distance from the sea, there are extremes of both heat and cold. With regard to rain, the west has rain all the year round, the east has rain in summer, and the south has rain in winter.

At one time the most people lived in the south, round the Mediterranean, where life was easier and pleasanter than it was elsewhere. They were farmers and grew grain and fruit; their descendants still follow the same kinds of occupations.

In the north the winter was colder and food could not be grown so easily. And just because life was harder people had to think more in order to make that life a success. But hard thinking and hard working, provided they be not too hard to crush the spirit of the worker, tend to produce men with bodily and mental strength. Europe, owing to its climatic and physical conditions, provides those that dwell therein with the opportunity, even as

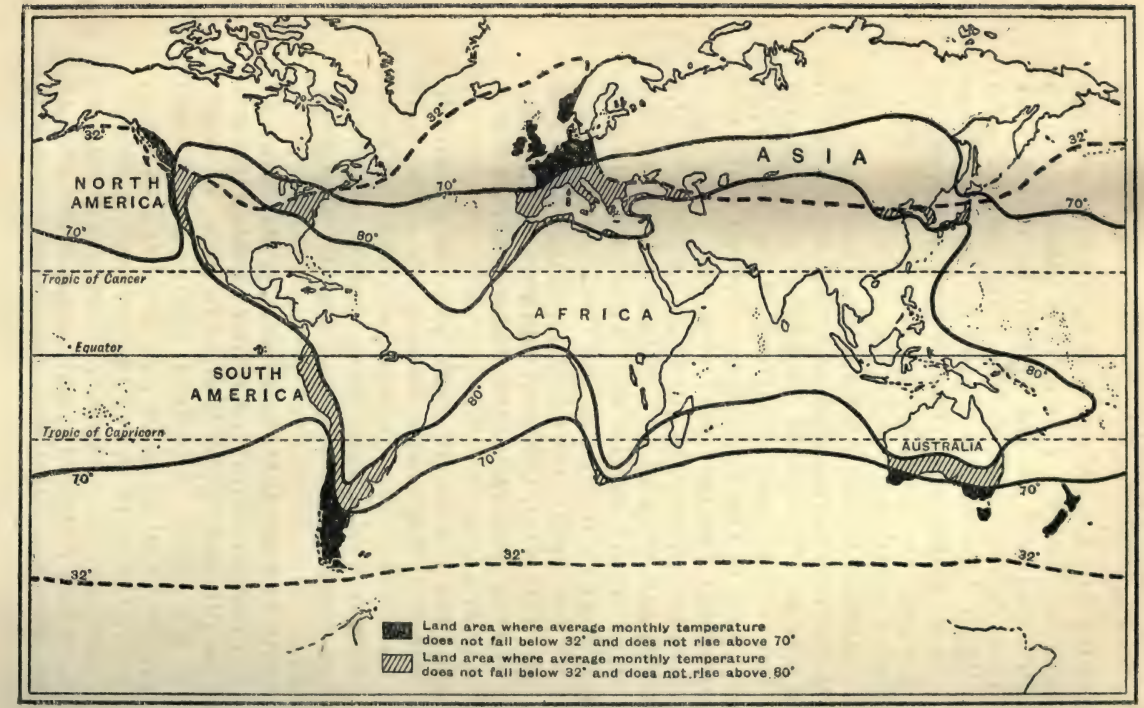

Fig. 55.—World : Temperate Regions

The broken lines bound areas where the average monthly temperature never falls below 32° F. The unbroken lines bound areas where the average monthly temperature never rises above 70° F. and 80° F. respectively. The black and shaded areas thus are those whose climate is temperate. There are six regions, of which the European and South American are the largest and most important

it forces upon them the necessity to work hard, and in the north-west, where the winters render it necessary to exercise forethought and prudence, is the part where it is best for man, physically and mentally, to live.

Another point must be noticed. Movement from place to place is much easier in temperate countries than it is in those that are either extremely hot or extremely cold. Now when men move from one place to another about the earth they meet other men, exchange things with them and so become more comfortable, exchange ideas with them and so become more intelligent. Shakespeare knew this when he wrote:—

> 'Home-keeping youth have ever homely wits.
> . . . . . .
> . . . . . .
> I . . . would entreat thy company
> To see the wonders of the world abroad.'

Hatred of foreigners, simply because they are foreigners, is a sign of intense stupidity; there is no single nation that has not gained and will not continue to gain from intercourse with men who live under different conditions. If we add together, as in a kind of sum, the necessity to work and the advantages of easy international intercourse provided in Europe, we get as a total result that industry, skill, and exchange of ideas that are so important in the conduct of human life.

Success, from the commercial point of view, depends on the possession of raw material, the skill to use it, and the power to drive the machinery that the skilled and thoughtful inventor has produced. The people of Europe have been fortunate in that their lands have possessed coal sufficient to supply them with all the power they have so far

needed for all their industrial enterprises. India and China are lands of farmers; Europe is the land where things are done by the power of coal, and there is no other region of the world that enjoys the same opportunities with the exception of certain parts of North America. The raw materials produced by the farmers of the world are taken to Europe and worked up into other things.

Let us take Germany and the Eastern States of North America and see how they illustrate some of the above remarks. With regard to Germany, note the following list and value of her exports (before the war):—

Sugar	£9,598,000
Dyes	8,605,000
Iron and steel	5,144,000
Leather goods	2,509,000
Wood	2,116,000
Woollen goods	2,116,000
Silk ,,	2,113,000
Hosiery	1,802,000
Cotton goods	1,604,000
Chemicals	1,482,000
Lace	1,428,000
Paper	1,152,000
Machinery (other than electric)	1,117,000
Motor cars	1,093,000
Glass	1,030,000
Toys	1,013,000
Electrical goods	906,000
Painters' colours	848,000
Electrical machines	743,000
Trimmings	725,000
Gloves	584,000
Pianos	561,000
Scientific instruments	524,000

It will be seen that the articles catalogued above represent more than half *power* and *skill*

and less than half raw material. And this skill was, before the war, cheap skill, for the German worker was amongst the worst paid and the most exploited of all the workers of the world.

It is natural that there should be evidence of the use of power, for there is a considerable amount of coal in Germany, but there is an equally good reason for the excellence of skill. The chief men in Germany set themselves to prevent waste and to stimulate learning. There are in Germany 171 university trained students for every 10,000 of the population; in England there are 5! As a result of the skill that came of this widely extended higher education, human energy was saved in all directions and the pushing industrious German seemed to people to be on the way to capture the trade of the world. We used, as a kind of taunt, the expression 'Made in Germany,' but the Germans themselves adopted it as a kind of motto and painted it in huge white letters on the side of a great German liner as she steamed up Southampton Water.

Then the criminal folly of her rulers plunged her into a disastrous war and wrecked the whole commercial fabric that she had so skilfully and so patiently erected. But it will be well for us in our hour of triumph to bear in mind that, if we are to maintain a supremacy in the commercial world of the future, it will not be by explosions of hate or outbursts of patriotic singing, but by the cultivation of a skill and industry that shall be superior to the skill and industry of all those whom we regard as competitors in the markets of the world.

One of our greatest imports from Germany was beet-sugar, which is largely raw material, but after that come a number of smaller things tending to

the luxury side of life, with some very necessary things that help us to live well at less expense.

Some of these necessary things, like dyes and chemicals, came into great prominence during the war on account of their value in the manufacture of munitions; they belong to that type of industry called *key industries*; key industries may not, in themselves, be of such immense value as cotton or coal, but they are more important than their actual amount would lead us to imagine, for the reason that they are necessary for the practice of other industries.

Take, for instance, the dye industry. Both the chief textile industries—cotton and wool—depend upon an adequate and suitable supply of dyes. And besides these there are the lace industry of Nottingham, the silk industry of Macclesfield and elsewhere, the making of paints, such things as ink, wall-papers, the colouring of leather goods, the colouring of hats, and the colouring of some foods. Some of the above industries might dispense altogether with the use of dyes, but the textile industries and some others, like the carpet and linoleum trades, are absolutely dependent upon aniline dyes if they are to exist.

Now look at the chief exports of the United States. The figures are for the year ending March 1913, in pounds sterling:—

Raw cotton	£109,400,000
Iron and steel goods	60,900,000
Breadstuffs	42,200,000
Meat and dairy products	30,700,000
Copper and copper goods	28,600,000
Mineral oils	27,400,000
Wood and wooden goods	23,100,000
Coal	13,000,000
Leather and leather goods	12,700,000

They are chiefly raw materials. For a long time they have been raw materials—wheat, timber, cattle, hides and, above all, cotton. But gradually there is coming about an important change. For instance the people of the United States now consume a great part of their home-grown wheat and have little left for export, and every year sees an increasing American consumption of the home-grown cotton. The things in which skill and the use of mechanical power were important were comparatively small in amount. It is still true, as the table shows, that the chief exports are raw materials, but it is also true that exports of the 'skill and power' type are rapidly on the increase.

'North America differs from all other lands, in that the greater part of it has been developed from the first by the use of new methods. For every man on the continent north of Mexico at the beginning of the nineteenth century there are a hundred now. Energy has been used on a great scale by people who, accustomed to hard work, have already scrapped some old notions, and are ready to adopt new ideas without prejudice. It is not only that men of European races were tempted to lands like their own, neither too hot in summer nor too cold in winter for work, yet hot enough for the growth of plants, cold enough to stimulate thought. Unsuited to early conditions, it is exactly such a land as might be developed quickly by men of Northern Europe with all the advantages which the possession of enormous supplies of coal energy give them.' [1]

[1] *Geography and World Power*, Fairgrieve.

XXII

THE RELATIVE IMPORTANCE OF IMPORTS

LTHOUGH a great deal has been already said about imports and their importance to Britain, we have not yet attempted to show how great that importance is when viewed in actual quantities. It is very easy to read figures but sometimes hard to understand them. They cannot lie, but it is not always easy to discover the truth, for they can only properly be understood in connection with many other things.

In the first place we shall look at the total values of the imports, not bothering about where they come from. So long as our imports of raw cotton are sufficient to keep the people of Lancashire busy it does not much matter what proportion comes from Egypt and what from U.S.A.; while our wheat supply is sufficient to keep us decently fed, it does not greatly concern us whether Canada, India, or Russia sends us the largest amount.

The next point to bear in mind is that the importance of the totals is relative—that is, their real importance depends to a great extent on the value of our home supply compared with the value of the foreign supply. The greater the proportion the imported goods bear to those produced at home the more they concern us. There are, for instance, many things which for various

reasons, usually climatic, we cannot possibly produce at all in these islands: such are cotton, coffee, and tea. In these the imports form the whole of our supply and their importance is therefore great, even though the actual total value of the import may be less than that of something else of which we ourselves produce a considerable quantity.

Consider tea and coffee on the one hand and textile goods on the other. In 1907[1] we imported, for our own use, tea and coffee to the value of £20,000,000, while the value of the imported textile goods was £36,000,000. At first sight it would seem that our imports of textiles were almost twice as important as those of tea and coffee. But when we compare these figures with the values of similar things produced at home we find that we produce no tea or coffee but that our textile manufactures were worth £232,000,000. So that tea and coffee imports represent 100 per cent. of the total supply, while textile goods represent only 13 per cent. When we notice further that we exported textiles to the value of £150,000,000 it is seen that we could, if necessary, have done without a great many of the textile imports altogether, but we could not have supplied ourselves with tea without the foreign supplies. It is obvious, therefore, that the amount of any import, considered by itself, does not give us a measure of its real value to us. It is only when we compare the value of the import with the value of the home production that we can fully realise what it would mean to us if that import were entirely cut off.

The greatest of our industries is the cotton

[1] The figures in this chapter are for 1907, as that is the only year for which adequate information of home production is available.

manufacture, and cotton goods occupy the first place in the list of our exports. But no raw cotton is produced in Britain, and we have to import annually about £60,000,000 worth. Cotton imports are thus relatively important for we import all our supplies, and they are absolutely important for they are more valuable than those of any other commodity. From a manufacturing point of view, raw cotton is the most valuable of all our imports.

The imports of other tropical products resemble cotton in the fact that they are only obtainable from overseas, but they cannot rival it in actual value. There are some other things, however, the imports of which approach in value that of cotton; meat, for instance, shows an annual import of £51,000,000. But we ourselves produce an annual supply worth about £60,000,000, so that the imports of meat represent only 46 per cent. of the total amount consumed. There is, in fact, no import which combines such a high actual value with such a high relative importance as cotton.

There is one import, however—wheat—which, although it is not of such a high total value and although some is produced at home, seems capable of challenging the claim of raw cotton to be considered the most important of our imports. In 1907 we imported wheat valued at £45,000,000 and produced wheat of the value of about £11,000,000—that is, the imports represented four-fifths of the amount consumed. Wheat is more essential to life than cotton; a reduction in the cotton import would result in some distress in Lancashire and elsewhere; a reduction in the wheat imports would be felt severely all over the country. Moreover, the greater part of the

manufactured cotton goes abroad, so that even if the import did decrease we might still be able to obtain enough to supply our own needs. But the wheat is all consumed at home.

Let us now turn to the other great textile industry—wool. In the Middle Ages, England grew all the wool she wanted and, in addition, exported large quantities. Now, however, Yorkshire is almost as dependent upon imported wool as Lancashire is on imported cotton. The annual imports of wool amount to about £22,000,000 and the home-produced wool to about £3,000,000 —that is, the imports represent between 80 and 90 per cent. of the whole. The same fact is true of almost all the rest of our raw materials with the exception of coal.

Of iron ore we import 64 per cent. of the supply (imports, £7,300,000; home production, £4,300,000). Of other ores our imports represent 88 per cent. of the supply (imports, £9,600,000; home production, £1,300,000). Practically the whole supply of materials for the other textile manufactures, valued at £13,000,000, comes from abroad. Similarly we import timber to the value of £26,000,000 and grow it to the value of £600,000. Whether it is a good thing that we should import such an overwhelming proportion of our materials is another question. In the first place, it is impossible for us even with the most intensive of intensive cultivation to produce all our own wool and at the same time to feed ourselves; even if it were possible it would be extremely expensive, and we should be much better employed in manufacturing goods to exchange for food supplies. And as for our stocks of metallic ores, they are not to be increased by any means within our power.

It might be advisable to try to increase our

production of food, especially when we consider the following figures which illustrate our pre-War dependence upon imports:—

	Imports in million £'s.	Home Production in million £'s.	Percentage of Imports to Total Supply.
Wheat and flour	45	11	80
Other grain	30	24	55
Meat	51	61	45
All other foods	103	40	72

In addition we import various oil seeds and nuts (palm-oil, ground-nuts, etc.) to the value of £26,000,000, a considerable quantity of which is used in the manufacture of margarine. The exact quantity used for this purpose is not known but it is considerable and growing, and for these necessary oils and fats we are wholly dependent upon imports.

In the matter of manufactured goods the relative importance of the imports seems much less as they form a much smaller proportion of the total production. Nevertheless some of these imported manufactures are really quite important because they are things which either could not, for some reason or other, be produced at all in Britain or could not be produced so cheaply. It is for this reason that many of the cheaper textiles, cutlery, etc., are imported; before the War many of them came from Germany. In addition most of our silk goods come from France and the East; they can be made more cheaply in the home of the silkworm than in a land that has to import all its raw material. Still, on the whole, as pointed out elsewhere, the value of the whole of our imports of manufactured goods is comparatively very small.

The following figures are interesting in connection with the above remarks :—

	Imports in million £'s.	Home Supply in million £'s.	Percentage of Imports to Total Supply.
Cotton	61	..	100
Oils and oil seeds	26	..	100
Tobacco	4	..	100
Timber	26	0·6	97
Wool	22	3	88
Ores other than iron	10	1·3	87
Wheat and flour	45	11	80
Iron ores	7	4	63
Grains other than wheat	30	24	55
Meat	51	61	45
Cutlery	3	5	37
Chemicals, etc.	10	27	27
Earthenware and glass	4	12	25
Metals other than iron	22	88	20
Leather goods	10	46	17
Yarns and textiles	36	232	13
Iron and steel	7	234	3

From this table may be seen not merely the relative importance of our home supply and imports, but the things which have to be imported and the things of which we produce such amounts that there is a surplus.

XXIII

NEWSPAPERS

N Chapter VIII. we called attention to the fact that the *Manchester Guardian* played an important part in helping to fix the cotton industry in Lancashire. It gives 'cotton news' that cannot be obtained elsewhere, and it employs for this purpose men who possess a knowledge of cotton markets more technical and detailed than that possessed by the writers attached to any other paper.

The newspaper is one of the keys that are used to unlock the gateways of commerce; it is not a necessary of life like food, clothing, or shelter; on the other hand, it is not in these days a mere luxury. It tends to render easier the bringing of things from places where they are produced to places where they are in demand, and because it renders movement easier than it would otherwise be, *it saves power*.

'So common an object as a newspaper is seldom the subject of serious reflection. If any one of us should stop to consider what it is and why it is made, it is odds that he would think chiefly of one aspect of it to the general exclusion of the others. The curious man might reflect in surprise on the vast amount of mere reading matter turned out regularly every morning, on the variety of typesetting and the amount of printing, often

more than sufficient to make a large-sized book. The manufacturer would direct his imagination to the efficient machinery necessary to produce perhaps 3000 copies a minute, or to the practical organisation able to distribute them as fast as they are printed. The business man would think chiefly of a newspaper as a vehicle for prices and a medium for advertising. Cooks, butlers, clerks, and governesses look upon it as a daily registry office. The solicitor sells houses and land through it. Housewives through it sometimes buy their soaps, and more often their hats. Actors, singers, authors, artists, and musicians each read their special column and wonder when the editor intends to engage some one really acquainted with the only subject worth reading. The politician will read its leading articles with smirking assent or explosive repudiation. Last of all comes the general reader, and he asks nothing more of his newspaper than that all the news of everywhere, collected at great cost, transcribed with finished skill, is presented to him in just the way which pleases and flatters him most. All of them have on their lips the daily threat of giving up the paper if they are not scrupulously satisfied.' [1]

As will be gathered from the above extract, with its references to advertising and the possibility of selling soap and hats through the medium of a newspaper, one of the functions performed by the newspaper is that of turning the whole world into one gigantic market-place; many newspapers even have a column headed 'the money market.' The trader who looks carefully at the money columns can see how prices are rising or falling in the different civilised countries; in other parts of the paper he gets news about crops; in another

[1] *The Newspaper*, Dibblee.

he learns the prices of the shares in different companies. All the facts bearing upon business are a help to the commercial man. He fails or succeeds largely according to the extent of his knowledge of trade movements and prices; *knowledge is power*, because it saves power.

A newspaper is one of the few things that we get at a less price than it costs to produce; the mere paper on which it is printed is always of more value than the price paid by the purchaser. But newspaper proprietors do not, therefore, suffer loss. They get their chief revenue not from the pennies of the newspaper readers, but from the fees paid by advertisers. In our country alone from £40,000,000 to £60,000,000 is spent each year on advertisements in various journals and periodicals. An equal sum is spent in Central Europe and at least four times as much is spent in North America. These vast sums 'enable the newspaper proprietor to give to his readers a product which costs him from four to ten times the amount which he receives from them in the purchase of papers.' And everybody gains. The reader gets eightpence worth or more for his twopence; the proprietor gets a profit out of the advertiser; and the advertiser gains by the fact that the more people read about the things he has to sell the more of these things they are likely to buy.

There was a time when goods were produced slowly and of which the store was therefore exhausted quickly; there were so many people waiting for them. The question, in the modern world, is how to sell goods quickly enough to prevent a glut of production. For instance, the present output of motor cars in America is at the rate of hundreds a day, and this stream of cars

has to be marketed as quickly as possible that the factories and warehouses may be cleared and the makers get their money back. Only by advertising can the difficulties be overcome; advertising stimulates demand and tends to prevent the output becoming in excess of the demand.

At first advertising was merely a method of giving the public information about goods. In these days it is much more than that. It is a kind of fighting force in the contest between the makers of rival goods. A well-written advertisement flatters the customer, appeals to his intelligence, his good taste, and his ability to know a good thing when he sees or hears about it. He may possess neither intelligence, taste, nor ability, but the good advertisement makes him believe he possesses them all. In addition, especially in technical papers, the advertisements have often a real educational value.

Advertisements have often helped to change markets; a customer usually goes to a certain shop either because of his conservative habits or because he does not know of any other. In the latter case the advertisement tells him that there are others and tries to persuade him to purchase there.

One other point—just as there are special exchanges for coal, wheat, cotton and so on, so there are papers that make a speciality of a particular kind of advertisement. For instance, domestic servants find what they want in the *Morning Post*; pressmen and compositors go to the *Daily News*. And there is as little change in this as in any other well-established market. 'The habits of the public are extraordinarily stable in this respect. When once a paper is recognised as the special organ for a particular

purpose every one has to buy it in this connection and *people save themselves the trouble of looking elsewhere.*'

The making of the newspaper is a long and complicated business. The first thing is the preparation of pulp; the commonest material, especially for the cheap daily paper, is wood. Much of this comes from the sub-arctic forests of Northern Europe; much also comes from similar forests across the Atlantic, particularly from those in Newfoundland. To turn this wood, or it may be rags or straw, into paper it is first boiled to render it soft and then bleached to render it white. The soft pulp is mixed with glue to strengthen it, and again boiled and stirred till it is of the proper stiffness. This is made to flow over a wire netting and so lose its excess of water, and is reduced to a thin white dry sheet. This 'half-stuff,' as it is called, is pulped again and the above processes all repeated. Finally the 'paste' passes between warm heavy rollers and comes out thin, strong and dry, and is wound in rolls containing as much as five miles of paper. The actual work of printing is too technical for description here, but it can be seen, on a smaller or larger scale, in every town in the works of the local paper.

But the mechanical operations are perhaps the least important part of the production of a newspaper. There is a great organisation connected with the advertisements and a still greater connected with the collection of news.

Though the newspaper gets its main revenue from those who advertise, it gets its readers on account of its news. The news items can be classified as official news, business items, and general matter. 'Official news covers all public

announcements, government and municipal publications, police bulletins, and matters of record from public registers,' and most of it comes to the editor without much trouble.

Business items are the most valuable and the most difficult to obtain. Very often there is a desire to keep secret, as long as possible, all information about important transactions; this information is more likely to be supplied by some one who wants to divulge the secret for reasons of his own than by those actually concerned in the transaction.

General news, such as reports of trials, political speeches, information about theatres, concerts, and books, is so abundant that the chief difficulty of the editor is to know what to select. The great aim of every paper, so far as general news is concerned, is to get first or exclusive information about matters that are likely to interest the public. When Amundsen went to discover the South Pole, the *Daily Chronicle* arranged with him that they should be the only paper to receive a telegram announcing his success.

When the newspaper has been printed it must, like any other commodity, be distributed. It is printed so quickly (a *Daily Mail* of eight pages can be rolled off at the rate of 132,000 copies per hour) that it must be got outside the building as quickly as possible. The papers are taken away to carts waiting outside or sent to the waiting-room for issue to persons who receive them by post. The carts take their loads to the station where they are despatched by train, often by special train. The advantage of having your own train is that printing can be delayed to a later hour and so include later news. The first paper to run a special train of its own was the *Manchester*

Guardian; this train enabled the publication of the paper to be delayed from 12.30 to 1.30 A.M.

The methods of distribution vary with the locality. In London distribution is difficult be-

Fig. 56.—Distribution of *Times* in hours after publication.

cause the tubes and local railways cannot carry goods traffic in any amount. Here the cycle, horses and carts, and especially motors are used. At night the roads are clear and the motors can run at high speed for long distances. A motor van can run twelve miles, from Fleet Street to Barnet, in less than an hour and stop twenty-seven times in

the last seven miles to deliver separate parcels to newsagents along the route.

It is much more difficult and much more important to distribute quickly the evening paper, and it costs a London newspaper as much as £1000 a week merely to place the evening editions on the market. Traffic in London is slow; the average rate in the city is about three miles an hour, so that large fast motor cars are not so quick as light carts and cycles that can push their way here and there amongst the crowd, and, be it added, the police are kind to cyclists with newspapers and often let them pass when they would hold up other traffic.

The modern method of distribution in London is to select certain centres and there assemble staffs of boys at fixed periods during the afternoon and evening. At given times a cart or cycle rushes up with bundles that are at once served out to the boys; there are about a hundred local centres of distribution.

And newspapers are distributed not only quickly but over great distances. Fig. 56 shows the distances reached by the *Times* within forty-eight hours of the time of publication. The area served includes practically all Western Europe, the fastest means of conveyance, aeroplanes to Paris and Amsterdam, being used.

When we are considering all the persons on whom we are dependent, it is important that we should bear in mind all those who make and distribute newspapers, from the man who fells the tree in the distant forests of the north to the newsboy who hands us the paper as we pass along the street.

XXIV

COMMUNICATIONS

LL life, all progress means movement; the only things that stand still are dead things. The farmer who grows plants has so to arrange his operations that tiny particles of matter shall move, in solution, into the rootlets of his plants; as the plants increase in size the distance that the minute particles have to travel is increased though it is always comparatively small. Industry also depends on movement. The cotton weaver moves threads through short distances into different positions with regard to each other; when the movements cease no more cloth is woven. Commerce means movement but over much greater distances; raw cotton comes from America to Britain, while the cotton cloth is carried to all the corners of the globe. If there were no such movement there would be no trade.

The question of movement is everywhere important, and one of the desires of the business man is to transport his commodities as cheaply, *i.e.* with as little use of power, as possible, because the cost of transport forms part of the selling price. Up to about a hundred years ago only a few valuable and small things could enter into the world's trade; the cost of carriage was too great. No matter how cheaply bulky things might be produced the cost of moving them any consider-

able distance so increased the price that they could not profitably be brought to market.

The earliest trade of all was done when things were carried overland by man and animals, and then about the only things obtained, say from the Indies, were spices or jewels, both of which were of such value in themselves that the expense of carriage, great as it was, formed only a small part of the total cost. And 'even after the Portuguese discovered the sea way to the Indies the whole amount of the spices brought to Europe in a year would go into the forehold of a modern coasting tramp, and spices were almost the only things which it paid to carry.'

Improvements in the size and sailing qualities of sea-going vessels, which made use of the energy of the wind, brought into the markets of Europe silks and the less valuable but still valuable products like sugar and tea. Finally coal and the steam vessel came to our assistance, and it was found possible to move almost anything to almost anywhere at a price which would permit the bulk of the inhabitants of the world to purchase what the ships had brought. 'The materials for man's food and clothing are brought from the ends of the earth—not luxuries only like spices and tea—but what forms the bulk of his meals and his dress. Only one-fifth of the wheat we use is grown in Britain. The vegetables a man eats are no longer grown in the fields near his home. Fruits our grandfathers never heard of come from other lands. The materials for clothing are no longer produced hard by but are brought in bulk from continents over the seas. . . . By the employment of coal to generate steam things were moved that it was not possible to move before and things were moved at rates never before dreamed of.'

The business man has always to consider, when he wishes to move things from one part of the world to another, not only the cheapest but sometimes the safest routes. The cheapest method of transport is by water and, for long distances, carriage by sea is almost always preferred to carriage by land. Heavy things, if they have to travel far, are always moved on the water and as far as possible by water. Large ports are situated as far inland as possible. Round the coast of England there are great inlets between which the land projects in peninsulas. One of these, the Wash, is shallow and unsuited for large modern vessels, but near the head of the tideway at each of the others are the four great ports of London, Liverpool, Bristol, and Hull. At the head of shorter recesses are Southampton and Newcastle. The same is true of the ports of the rest of the world. Hamburg and Marseilles are not of mere local but of continental importance, while Lisbon, though it is on a tidal entry, is yet placed at the end of a far-reaching peninsula and can be of only local importance.

Fig. 57.—The Sea Entries of England

If heavy goods are exceptionally valuable they may still be moved long distances by land. For instance, a certain quantity of the finest quality of tea has been carried overland from China to Russia. The price at which it was sold — 20s. a pound before the War — indicates how land transport tends to raise prices, and it was only

because the tea moved in this way was specially valuable that it could stand the high cost of carriage.

Speed is sometimes as important as cheapness if it be necessary to put goods on the market at a particular time, or if they deteriorate on a long journey. For instance, wheat, which is none the worse for slow transport and can be marketed all the year round, can be moved in slow, clumsy sailing vessels; on the other hand, live cattle, which deteriorate rapidly on a long journey, are carried either by rail or fast steamers, as the apparently cheaper, slower sailing vessels would be the dearer in the end. The ports at which fish are landed are usually as near the fishing-grounds as possible, the fish being carried quickly to market by rail. Wick and Yarmouth are situated as far out as possible. Then, too, it still pays to send very expensive articles by the quickest, even if it be the most expensive, route, and hence they may go, when possible, by rail. It is likely that, as speed is an important factor in the marketing of certain kinds of goods, they will soon be carried by air; there can be no doubt whatever that in the future the business man will make more and more use of the aeroplane when speed rather than cheapness is what he most desires.

Fig. 58.—The Sea Entries of Western Europe

One of the things that it is necessary to carry rapidly are 'the mails,' that is, the letters by means of which business men keep in touch with their customers, their agents, and their markets. The postal services of the civilised world are remarkable for their speed, safety, and cheapness. The necessity for rapid correspondence supplied a reason for every attempt to improve means of communication; improved means of communication, in their turn, have speeded up the rate at which letters can be exchanged. The mails act something like newspapers, except that the contents are private; they spread knowledge between man and man; they help him to know and to meet the wants of the world—'knowledge is power.' The mails save time, and the time saved can be used in making more goods and therefore more profits—'time is money.'

The value of speed in the matter of selling is expressed in the familiar 'S.P.Q.R.'—small profits quick returns—of the shopkeeper. He gains more by selling many articles quickly with a small profit than by selling a few things slowly with a large profit on each; the customer gains whenever, for any reason, the shopkeeper reduces his profits. The more rapid the 'turnover' the better it usually is for both dealer and consumer.

The actual routes along which goods are moved are determined by two main considerations:—

1. *Demand for Communications.*—There is a demand for communications between two areas when there is something to exchange between them. The demand of the people of Western Europe for wheat sets up voyages across the Atlantic from Canada and the Argentine, and through the Black Sea and the Mediterranean from Russia; the demand for cotton establishes

a route between Liverpool and the southern states of America. The demand for wool and chilled meat is responsible for a certain amount of communication with Australia either through the Suez Canal or round the Cape; tea and grain from India cross the Indian Ocean and approach Europe through the Suez Canal; timber causes connections with the Baltic during summer and autumn. In the same way there is a demand for communication between a manufacturing area and a farming area, between city and country, and, as we have seen in Chapter XIII., between a market-town and the country that supplies the market.

It is obvious that the importance of routes will be in proportion to the number of people in the towns or areas concerned. The railway routes between London with its seven millions of people and South Lancashire with a comparable population are some of the most important in the world. Now, there are three areas in the world with great populations, each having a quarter of the total, and there is a fourth with a smaller yet still large number of inhabitants. The three are Eastern Asia, India, and Western Europe; the fourth is Eastern United States and Canada. The four all lie in the northern hemisphere and there is a great circular route connecting them of which the sea road to India and the Canadian Pacific Railway are only parts. In the southern hemisphere there is no great area of population and no great circular route. South America, South Africa, and Australia are connected by routes to the northern hemisphere rather than to each other.

2. *Possibility of Communication.* — There is a demand for timber in Western Europe, and yet there are huge areas of Siberian forest that are

untouched. That forest is full of valuable timber, and lumbering would provide a healthy occupation for many people. But the forest is far from

Fig. 59.—Northern Hemisphere: the areas of dense population and the connecting circular route

lands where the timber is in demand, and the only means of communication are by land, which are too expensive. There are rivers, but they flow into a sea that is nearly always frozen over. Or again, the Baltic timber route, which is important

in summer and autumn, is closed in winter when the sea is frozen over.

In agreement with what has been said at the beginning of the chapter it will be noticed that the routes for heavy materials are mainly sea routes ; it is the sea routes and not the land routes that are really important in a great deal of world trade. For instance, the mass of the wheat that moves from one country to another moves across the sea. About one-third of the wheat sold in the big world markets moves out of the Black Sea to the countries of the Mediterranean and Western Europe, another third moves across the Atlantic from North America, while the remaining third moves across the oceans that connect Argentina, India, and Australia with the populous lands of the northern hemisphere.

But of course only the surplus of a wheat crop comes into world trade and all the rest is carried by land, while passengers and mails, because they must travel as quickly as possible, go by land routes in preference to the sea, whenever the land routes are safe.

Whether the routes by which these things are marketed be by land or water they will, other things being equal, follow the shortest possible line between areas of supply and demand. Again it is the saving of power that is aimed at. Upon the land mountains, lakes, rivers, swamps, and deserts divert the shortest line to the shortest easy or possible line ; it is only in flat open plains like those of the Argentine that railway lines are ever approximately straight. Roads usually take the lowest routes over hills or may even go round them ; railways run up one valley and then pass by a tunnel to the next. The railways to the north from London avoid the heights of Hamp-

stead and Highgate, but two of them tunnel through the Barnet Ridge and then make for the lowest parts of the Chilterns. The railway from Marseilles to Paris is also controlled by the relief. Marseilles is such an important port not only because it is placed where the sea comes far into the land, but because of the possibility of a route inland allowed by the Rhône valley which leads to the Rhine valley on the one hand, and to the Paris basin on the other. In the days of sailing vessels it was the winds and ocean currents that determined sea routes; a long journey with the wind behind was faster than a shorter journey in opposition to the wind. In Figs. 62 and 63 this is seen to be the case as late as the early nineteenth century, when the tea clippers went to India for tea. The routes there and back were entirely different, and were chosen entirely with a view to getting most help and least hindrance from the wind. Steamships, if they be large and powerful, take little heed of winds and currents, but smaller and weaker ones still avoid battling with such winds as the westerlies of the

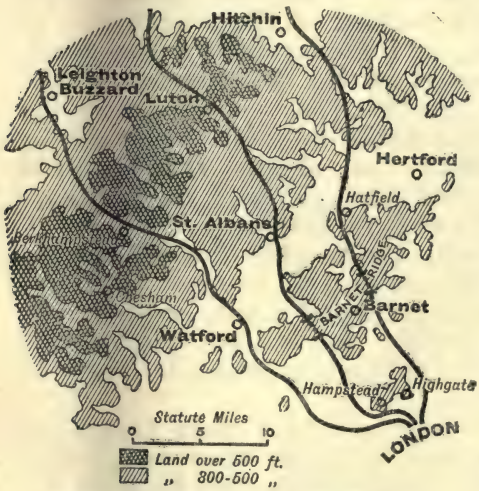

Fig. 60.—Highlands and Railways north of London

southern hemisphere, and the largest of steam vessels still sometimes find it desirable to turn aside to avoid storm paths, ice, sunken rocks, or other dangers to navigation. Thus, ships bound to Australia via the Cape would find the shortest route from Cape Town to Melbourne to be along a great circle from Cape Agulhas, but this route would carry the ship too far south into dangerous waters and is not followed.

Fig. 61.—Rhône Valley

As a result of the need for communication and the possibility of communication, routes have been established along certain lines. Where such lines meet there is a specially important point because it may be reached from several directions. Such a point may be a local market centre (see p. 130) for a small district or it may be the centre for a great area as is Paris. In the case of Canterbury roads naturally converge to the lower ground or gap

in the hills. In the case of Paris the scale is greater, for Paris is the centre for the whole of France (Fig. 65), but it is none the less certain. Such towns may be called *nodal* towns as they are like nodes or knots on a string. When such a nodal centre is fixed by the convergence of roads, other roads are made to converge to it simply because the town is there and people wish to go to the market. Many roads lead naturally to London where the bridge over the Thames was built, but many others have been made to meet there. Even air routes have been made to converge on London, as Fig. 64 shows. This happens not because there is anything in the air that makes it easier to fly in a particular line but merely because London is there. Partly because of the ease of travelling to certain cities, partly because they are in productive areas, these cities stand out as commercial centres. In Chapter XIII. we spoke of the growth of markets and the importance of habit in keeping things as they are. Habit tends to keep market-

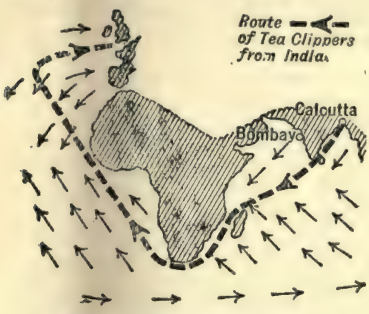

Fig. 62.—Route of Tea Clippers from India

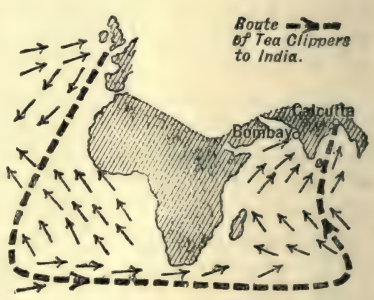

Fig. 63.—Route of Tea Clippers to India

towns in existence, but it is an enormously stronger force in the case of great commercial centres.

Fig. 64.—Air Routes as allowed by Air Ministry, May 1, 1919

We naturally expect the greatest commercial centres to be on the northern belt of communications. There the areas of greatest population

are and these lands have been civilised for a long time; their inhabitants know how to save power or use it to the greatest advantage. For all these reasons London, New York, and Paris

Fig. 65.—Routes converging on Paris

It is seen that Paris is the natural centre of France

stand out. They are in regions where not only is power used but where the greatest value is attached to skill. They are centres not merely of local or even of national commerce but are international centres of commerce. The control of the trade of a great part of the world is centred in each.

XXV

COMMERCE

THIS is a geography book of a particular kind; it is described in the sub-title as 'an introduction to *economic* geography.' To define 'economics' so that the term is understandable by all and sundry is not easy; for our purpose it may be said that economics is concerned with getting things done cheaply, *i.e.* of using as little power as possible. And, as we have shown, getting things done cheaply is largely a matter of knowing and making use of geographical conditions. But geographical conditions are not the only things that matter. Trade can be helped or hindered by many other things; everything that hinders means waste and expense, is in fact uneconomical; on the other hand, all that tends to help means cheapness, means saving, is economical. In modern times one of the great helps is the bank, whose operations tend to make the exchange of commodities easier in ways which we shall presently indicate.

The bank stands, for most of us, as a place where wealth in the form of gold or silver, *i.e.* money, is stored. But wealth is not really money at all; it is *things*. The wealth of the farmer is his wheat or fruit, that of the fisherman his fish, that of the miner his coal. And we could do without money at all if each of us had enough

of the things we desired. Ruskin pointed out many years ago that if all the money in the world were destroyed, the world as a whole would not be any poorer than it is now because the really necessary things which it contains would still all be left.

If we go back far enough in time we come in every country to days before money in any form was invented. Then the man who had fish to spare exchanged it with his neighbour for something that the fisherman wanted and the neighbour could spare; this was *barter*, the beginning of all trade or exchange. But barter was a clumsy way of carrying out exchange because the man who had a surplus, say of fish, could not always find some one who wanted his fish, and his difficulties were still greater if he wished to exchange his fish for a particular thing, say corn, and not for anything else. He then had to find a farmer who not only had a surplus of corn but also desired to exchange that surplus for fish.

It is not possible here to trace all the stages by which the use of metallic coins was brought about, but it was a great advantage to civilisation when they were adopted. They enabled the fisherman to exchange his fish for coins which he could store or which he could carry to some place where he might exchange them for clothes or food.

Storing coins was a dangerous matter; it invited theft. The owner of the coins soon realised that safe storage was both a difficult and a desirable matter, and in this desire for security we get eventually the origin of banks; at first they were merely storehouses. The banker simply took care of the money and charged his customer something for the trouble and risk that this involved. But

when the money was resting in the coffers of the bank it was of no use to any one; it was hoarded, not employed. An advance was made when this money was put to use by being lent; the borrower paid the bank for the loan so that the banker made a second profit. The extra sum paid by the borrower for the loan is called *interest*.

The lending of money was a good thing for the community at large. 'Let us take the case of a man who has a bog on his farm which, if drained, could be turned into fruitful land and made to produce good crops. The man is not rich enough to undertake the necessary expense, and is obliged to leave the bog alone for want of knowing some one who could lend him the money. He may require so much that one man's savings would not be sufficient. But if he can borrow from the bank he can use the savings of people whom he has never seen and pay interest on the money to the bank. When his bog is drained so as to produce good food, it will give back extra food for the people and so repay the money spent upon it. In the same way a manufacturer who wants new and expensive machinery can borrow the money to buy them and thus produce more wealth'—that is, more things. Ruskin was not quite right. If the money in the world were destroyed the world would be a little poorer, for there would be fewer things made and less wealth.

Banks will also take care of money without charging anything for the trouble, provided they are allowed to keep it for some fixed time; in fact, in such cases they will even pay interest to the depositor. It sometimes happens that a man has two accounts at the same bank: (1) a *deposit* account which he cannot withdraw till the end of a fixed time and on which he receives

interest; (2) a *current* account which he takes out in small or large amounts as he pleases and on which he pays the bank something for their trouble in looking after it. The banker makes a profit on the deposit account by lending it to borrowers at a higher rate of interest than he pays to the depositor. One of the ways, then, in which banks help business is by lending money for the purchase of machinery, the erection of factories, or for other productive purposes.

We must next notice that even where civilised man has arrived at the idea and use of coins it will be very difficult for a man doing business on a big scale to carry coins about in sufficient quantity; they are too heavy. One of the authors of this book once lived in a land where his monthly salary was paid in silver bullets, and though the salary was small the weight of the bullets was so great that he always had to employ a horse and carriage to carry that salary to the bank. And so we come to the use of *bank-notes*; the paper of which the note is made is worth next to nothing, but the note is really a promise, on the part of the bank, to give to the holder as much gold as the note is said to be worth, whenever the gold is demanded. In this way we can use light paper instead of heavy metal, but only because we believe the bank will keep its promise to pay in solid cash when requested so to do.

The bank-note is not the only kind of paper used. Suppose I have £1000 for which I have no immediate use; I put it in the bank, that is, I give it to a banker to take care of. Presently I go, perhaps, to a tailor and buy clothes to the value of say £20. When I receive the clothes I do not carry £20 to the tailor, either in cash or notes; the bank has my cash. I write out an order to

the bank telling them to pay the sum of £20 to the tailor on my behalf; this order to the bank is a *cheque*. The tailor, on receiving the cheque, is most unlikely to ask my bank to give him £20 for it. He pays the cheque into the bank. All that happens is that in the accounts which the bank keeps £20 is taken from my total and £20 added to the amount he is credited with. Then, possibly, he pays his landlord £20 for rent by means of another cheque and so business goes on, each person being able to get goods to the value of his deposit in the bank; goods pass freely, money little if at all.

Banking is really a system of keeping an account of what a man has done with his money. The bank's books show how much he has received and from whom he has received it, how much he has paid away and to whom he has paid it. Small change is kept in the pocket for small transactions; when a big sum or a lot of little ones are concerned, banking saves time and movement of cash.

Only a very small amount of actual coin is used in business. Far and away the greater amount of money is exchanged by means of cheques. Bank-notes are used for most other transactions. All this makes for saving of energy and for cheapness.

It is important to remember the difference between a cheque and a bank-note. A bank-note is a promise on the part of the bank to pay in gold what the note is worth; a cheque is an order from a person to a bank to pay to some other person the sum named on the cheque. Obviously it would be useless to order the bank to pay any given amount unless the person who gave the order had already placed at least that amount to his credit at the bank. Notes and cheques

are only accepted when people trust each other. The bank-note would be of no value unless people really believed the bank to be able and willing to pay cash for it, and no man would take a cheque in payment for goods unless he believed that the man who gave the cheque had money enough in the bank to enable the bank to carry out his order to pay. One of the advantages possessed by the lands of Western Europe and America is that in these lands a man's word is trusted, and in the lands where people are trusted goods tend to be cheaper, for there banks can be used to save doing things that otherwise would be necessary.

We have still to consider, briefly, another form of payment by paper to save time and cash movement. Suppose Jones in Hong-Kong owes Smith in London £1000, and that Smith owes Brown of Hong-Kong also £1000. Jones could send £1000 to Smith in London, and Smith could send £1000 back to Hong-Kong to pay Brown. This is quite simple, but it is much simpler for Smith to send an order to Jones to pay £1000 to Brown. Smith neither receives nor pays anything, Jones has discharged his debt, Smith has discharged his, and Brown holds the £1000.

The order which Smith sent to Jones to pay Brown is a *bill of exchange*; it is something like and something unlike a cheque. A cheque is payable on demand; a bill of exchange is usually payable only at a future date. A cheque is an order to a bank to pay; a bill may be an order to a merchant, a business house, a bank, or, as in the illustration given, to a man who is in debt to the person who gives the order.

In actual practice the business is much more complicated than this. Amounts do not always balance in this way, or all the creditors and debtors

of a given person live in the same city. But the above explanation is sufficient to give an idea of another very useful method of payment. We have pointed out previously that goods can be bought only in exchange for goods or for work done on the goods. But the use of money and systems of credit enable the exchange to be conducted with the least expenditure of time and work.

Now, just as a bank in a town acts as a convenient centre where a record is kept of the amounts that people pay to each other without any coin or note actually passing, so the great commercial centres of London, New York, and Paris are themselves banking centres where the accounts of the rest of the world are kept, and they are all the more important as commercial centres because they are banking centres. To the advantage of being nodal centres in the areas where skill and power are utilised to the greatest extent is added the advantage that they are the centres in which the trade of the world is organised. For long London was the undoubted money market of the world, but during the War more and more of the control passed to New York. New York is the natural port of entry and exit on the east of the United States. To the west is the easiest way to the great plains, and routes converge to the region in which New York is situated, and especially to the city itself. It is thus the trade centre, and being the trade centre it is also the banking centre. In newspapers giving information about trade will be found among all the other commercial news a column headed 'The Money Market,' and we are told what is the price of money in two places—London and New York.

XXVI

CONCLUSION: THE BALANCE SHEET

E have now nearly arrived at the end of our study of certain branches of economic geography. Perhaps the most striking result of this study is the fact that we seem to be dependent on all kinds of people, all over the world.

Leaving out of account our own country's supplies we find that 'the baker or miller desires various kinds of corn or flour: oats from Russia, Scandinavia, or Canada; wheat and barley from Russia, Germany, Austria, Hungary, Belgium, America, India, and Australia; maize from Southern Europe, South America, and Southern North America. The confectioner desires the fruits of all zones, the rice of the Tropics, and the spices of the equatorial East Indies. The manufacturer asks for the cotton of America and the Indies; the hemp and flax of Russia, Italy, the Netherlands, Canada, and Australia; the jute of Hindustan; the wool of Saxony, Spain, Asia Minor, Tibet, Cashmere, Australia, the Cape, La Plata, Chile, and Peru.

'The doctor and chemist search for the drugs and spices of the Tropics, the dyes of Central and South America, and the essences of Asia Minor and Persia.

'The artist can rejoice in the dyes, paints, and

colours of the warm, temperate, and tropical regions; the sculptor can exercise his art on the beautiful white Carrara marble of Italy; while the invalid or convalescent can be refreshed with grapes of the vine countries, the pine-apple of the West Indies, the oranges of Spain, Italy, and Australia, or the bananas of the equator.'

Or if you would consider the matter from a narrower point of view, think of one simple article to be found in a draper's shop. 'Look at a lady's parasol—possibly a covering of silk from Italy, Brusa, or China; dyed with madder from Turkey or Asia Minor, the logwood of America, or the indigo of India; fringed with lace from Honiton, Mechlin, Brussels, or Valenciennes; expanded formerly on whalebone from the Arctic Seas, or more recently on ribs of steel wire; set on a cane from India, or of sandal-wood from the East Indies or West Australia; with a ferrule of copper from Cornwall or Chile; surmounted by a handle of ivory from Central Africa, and inlaid with mother of pearl from the Persian Gulf or Ceylon; and perhaps covered lightly with the beautiful fringed muslin of Dacca.' If the actual sources of the materials mentioned are no longer quite correct it is still true that we draw our supplies from the ends of the earth, and we learn besides that there is a continual variation in trade. Each material is produced where these advantages are geographical or economic.

All these things are brought to Britain as cheaply as possible because of world-wide organisation. This may be made more obvious by the consideration of a particular case. We have already shown what numbers of people are employed in the organisation which supplies us with bread from wheat

grown in Britain. We can now realise how much greater is the organisation necessary for the supply of wheat from overseas, and can understand how the price of bread is regulated. In 1913 the farmer who grew 1000 bushels of wheat in North-West Canada received 660 dollars when he delivered it at the wayside station nearest his farm, but the cost to the consumer in Britain was much greater. First there was the charge of 17.50 dollars of the country elevator, or store, at the station, where the grain was weighed, cleaned, insured for a fortnight, and loaded on a train. Then there was the cost of railway freight, 120 dollars, to Fort William, the first place where there is deep water. The Government inspector took samples of the grain and guaranteed its quality for 1.60 dollars; he does his work so well that his word is taken anywhere. The middleman found a buyer and paid the farmer, and charged 10 dollars; this saved the farmer going a long distance and wasting much time going to market. When the grain was stored at Fort William it had to pay rent, and for this 7.50 dollars was charged; this was less than half the charge at the country station, but the elevator at Fort William could afford to work more cheaply because it worked on a much larger scale; enough wheat to last all the people in Britain for two months can be stored at Fort William at one time. The water transport on the lakes cost 20 dollars and the insurance while crossing cost 5.60 dollars. The wheat was landed at Georgian Bay as the vessels carrying the wheat on the lakes are larger than the ordinary ocean tramp and cannot pass through the canals. The charge of the transfer elevator at Georgian Bay, where the wheat is merely transferred and stored for a day or two, was 2.50 dollars. The rail to Montreal

cost 42.50 dollars, the elevator there cost 9 dollars, and the exporter charged 5 dollars. The exporter deals with very large quantities and can afford to work more cheaply than the middleman who deals with 1000 bushels from one farmer and 2000 bushels from another. The bank charges were 5.50 dollars; this was for the trouble of keeping the accounts. Now it takes wheat from six weeks to two months to get from the North-West to Montreal, and during that time it has to be financed. The charge of 10.85 dollars was made for the interest on the financial transactions till it got to Montreal. The ocean freight cost 75 dollars, and the insurance till the wheat reached Liverpool was 4 dollars, less than the insurance on the lakes. Finally the cost of documents, stamps, and things of like nature was 10 dollars. If all these items are added up it will be seen that the cost in Liverpool was over 1000 dollars, or half as much again as the farmer received, and that the number of people who had to do with the producing and bringing of the wheat to Liverpool must have been enormous. Clerks in insurance offices and banks equally with those in railway stations and with porters, signalmen, and sailors worked to supply the raw material of bread. We are linked together by that commerce, or exchange, which is at the root *work*, and the most important thing to us and to all those others to whom we are bound is just one man's work for one day; observe 'work' not 'money,' though we estimate the amount and quality of work by the money and also by the product.

But there is one condition upon which we may receive all the things that come to us; we cannot get something for nothing, not even ninepence for fourpence, in the world. And therefore if these

things are to be ours, if the fields and mines of the globe are to lay their treasures on our shores, we must be prepared to pay, and we can pay only by work, not by wishing or praying. Other people will not send us the results of their labours if we have nothing to offer in exchange. Nor can we British folk determine the prices of these foreign goods and say what the prices *must* be. The prices depend on the values set on the goods by the foreigners who produce them, and at any moment they may refuse to send their cotton, tea, iron, or bananas except at a higher price than we have been accustomed to pay for them. It takes a Hindu a whole day to pick one pound of tea, for which we pay 2s. 4d. As this price includes cost of labour, transport, insurance, distribution, and all other charges and profits at each stage, it can be easily seen that the pay of the Hindu labourer on a tea plantation is not very great. When he receives 10s. a day the cost of tea will rise to 10s. a pound in order to pay for his labour alone. And some day he may demand and get this amount — a poor outlook for the British tea-drinker.

Of course we are not compelled to import the things we have not at all or not enough of. There are plenty of this world's good things that the Eskimo would like to have, but he does not get them because he has nothing to offer in exchange for them; he has to go without, and in his case it is not for want of industry but for want of opportunity that he is poor. If at any time, as the result of a diminution of the work done in this country, we could not offer goods in exchange for those world products that we need or think we need, we should, like the Eskimo, be compelled to go without.

The greater part of the things that come to us are raw materials, food, and manufactured articles, though the bulk of our imports of 'manufactured goods' is nothing less than the raw materials of some other industry, or the tools and machinery required to work them up. In 1907 according to a Government White Paper we imported goods to the value of

£522,786,000.

Out of this, manufactured goods were worth £130,400,000, but most of these belonged to the class mentioned above, and the value of the completely manufactured goods, those ready for immediate use, not requiring any more work to be done on them was only £57,400,000. The position will be better understood by saying that out of every pound's worth of goods imported from abroad in 1907 eighteen shillings' worth consisted of food, raw material, and half-finished manufactured products and two shillings' worth consisted of complete manufactures. We might do without the two shillings' worth, but what about the rest? For these we must pay. We must send out something in return just as the people of Bradford send out woollen goods in return for what is brought into the city. How do we do it?

First of all we do not do it with money. There are not enough sovereigns in the world with which to carry on such a trade. We pay in the following ways:—

1. We send out the mineral *coal*. We have to remember that coal is capital; once spent it cannot be replaced. When it has all been spent we can buy nothing more with coal. By exporting coal the country is becoming poorer not richer.

2. We export coal indirectly in manufactured goods. Every yard of cloth, every ton of steel that leaves our ports means the expenditure of coal, though it is not included in the figures of the coal export.

3. We export skill. This, like much coal, is exported in the form of manufactured goods. A yard of cotton cloth is worth much more than the cotton of which it is made, and the more skill that has been employed in its production the more is the value that has been added to the raw material. Now fortunately skill is not altogether capital. It can persist undiminished, it can even increase with the use. It is shown in the operations of the merchant, the labourer, the banker, the distributor, and wherever it is employed it tends to give an abundant supply of goods for exchange, that is, to pay for the things we import from abroad.

4. We pay by the interest on our investments abroad. From time to time out of our savings we have lent money to other countries, and for these loans interest is payable. The interest may be paid in cash, but it is more usually paid by sending various products. One effect of the War has been that much of the money on loan has had to be used to pay for things we required to carry it on, and there is the less interest with which to pay for imports.

5. Ocean freights on British ships help to pay. We do most of the carrying trade of the world and we do not do it for nothing. It all has to be paid for somehow. The skill of our sailors does not figure in the nation's balance sheet as worth so many pounds, but it has to be taken into account all the same. The import of 1000 bushels of wheat cost 1000 dollars, but 75 dollars of that was

paid for ocean freight, and if the ship was a British ship it would be paid in Britain.

6. The services of banks and commercial houses in keeping the accounts and generally aiding business must in part be paid for by those outside Britain who benefit.

The first three of these groups are those we generally think of as *exports*: the last three are sometimes called 'invisible exports.' If we look at the imports and exports for the year 1913 we find:—

Imports . . .	£768,000,000
Exports . . .	635,000,000

It looks as though we had bought more than we had sold. If this were really true and the process continued year after year we should become bankrupt and receive nothing at all from abroad. It is quite certain that we pay for all we buy; other nations do not send us their wares as a gift. The difference between the values shown above was made up and more than made up by the invisible exports.

We have already considered our imports. For comparison it is well to note now the destination of our chief exports in 1913:—

1. The largest of these is *cotton*, to the value of £120,000,000. Our cotton goods go to every country in the world, but most of all to tropical and sub-tropical regions where thin garments are needed:—

India . .	£35,000,000	Australia . .	£4,000,000
China . .	10,000,000	Egypt . . .	3,000,000
Turkey . .	4,000,000	Java . . .	3,000,000

Although India grows a great deal of cotton, it is cheaper to send the raw material to England

to be manufactured on account of our abundance of cheap power.

2. *Iron and Steel* (£54,000,000).—This goes mainly to undeveloped countries, in the form of rails, and to countries that are developing; the finer goods are sent to the more developed countries:—

India . . .	£9,000,000	South Africa	£3,000,000
Australia . .	6,000,000	Japan . . .	2,300,000
Argentina .	4,000,000	Canada . . .	2,000,000

3. *Coal* (£51,000,000).—This is taken by countries which have little or no coal, and forms a payment for goods sent to us:—

France . .	£8,000,000.	Little coal.
Italy . . .	5,000,000.	Practically no coal.
Germany .	5,000,000.	Poor coal.
Russia . .	4,000,000.	Coal undeveloped.
Sweden . .	4,000,000.	Little coal; our coal pays for iron ore.
Argentina .	3,000,000.	Little coal. Coal in this case is useful as a cargo for the ships going out to fetch wheat.

4. *Machinery* (£37,000,000).—Machinery, like steel and iron, goes to countries which are developing and becoming industrialised:—

Russia . . .	£4,000,000	Australia . .	£2,300,000
India . . .	3,400,000	Argentina .	2,000,000
France . . .	2,400,000	Japan . . .	2,000,000
Germany . .	2,000,000		

France and Germany are of course not undeveloped countries, but they have not all the iron necessary to make their own machinery, and Germans and Frenchmen pay for our skill just as we pay for theirs.

5. *Wool* (£26,000,000).—To cool countries where warm clothes are needed:—

Canada . .	£3,000,000	Argentina . .	£2,000,000
Germany . .	3,000,000		

Germany cannot make fine woollen goods so well as England, and buys them from us.

6. *Chemicals* (£11,000,000).—To fairly civilised countries; the others have no need of chemicals:—

U.S.A. . . .	£1,400,000	Australia . .	£600,000
France . . .	1,400,000	India	500,000
Italy . . .	1,000,000	South Africa .	500,000

7. *Apparel* (£10,000,000).—Largely to British possessions, perhaps because the inhabitants like to wear British goods:—

South Africa	£3,000,000	Australia . .	£1,000,000
Canada . . .	1,000,000	New Zealand	800,000

Textile goods, iron goods, and coal, which are seen to make up half of the exports, are just those things which we might have expected to find.

But it must not be imagined that it is necessary that our exports should go to exactly those countries from which we obtain our imports, any more than we pay the butcher or baker with the things we ourselves produce. We must pay in some way for what we use, but the existence of banks, and especially of the great banking centres, enables countries to conduct their business with much greater ease than would be possible without them. In practice very little money actually passes between countries. Bills of exchange (see p. 256) are used for most transactions, and exports and imports are so adjusted that only a very small amount of gold requires to be sent.

There is this difficulty, however, that as

commerce is a matter for individuals, no one can say at once whether people in Britain are importing more than can be paid for by exports. Sooner or later, however, it is discovered. When more things are being imported from than exported to the United States, for example, there are more British people who wish to pay for things in the United States than there are Americans who wish to pay for things here, and there is more demand for bills of exchange across the Atlantic than in Britain. Then the value of American money, the dollar, rises as compared with British money, the pound sterling. We say the *rate of exchange* varies. Just as a thermometer by its rise and fall tells the temperature, so the rate of exchange by its rise and fall tells whether or not we are buying too much.

We now know what comes into the country and what goes out, but before we are in a position to take stock of ourselves we must also know the value of our own work. It is not easy to find this out, and it has been no one's business to do so. From the Census of Production in 1907, the only year such a census has been taken, we learned roughly how we stood in some matters. For this census each trade had to state the value of the goods produced and the value of the raw materials used. The difference between the two represented the value of the work done in the trade. Measured in this way, the value of the work done by all trades in Britain at that time was about £900,000,000.

But this does not represent the value of all the productive work. For example, in this census no account could be taken of the fact that the value of food was increased by the cooking done by all the housewives and others. Further, the value given above is the value of the work done

to products when they leave the factory or workshop, and nothing further requires to be done to make them, but their value is increased considerably by their distribution to the consumers. A guess may be hazarded that if all this productive work be taken into account its total value in 1907 would be about double the amount given in the Census of Production, *i.e.* £1,800,000,000.

This amount represented the real income of the country. It must balance the expenditure; it must pay the wages and salaries of every one in the country, not only those who did productive work, but those who were doing unproductive work and those who were too young or too old or too infirm to do any work at all; it must pay for doctors, lawyers, teachers, government officials, the police, men of the army and navy, nurses and patients in hospitals. The population of the British Isles was then about 45,000,000, so that on the average each person in Britain could have been allowed £40 per annum.

We can now make our National Statement of Accounts for the year 1907. It is not the 'Budget' statement, which is concerned merely with the cost of government. It will look something like the following:—

Work done	£1,800,000,000	Exports (coal and skill)	£450,000,000
Imports	550,000,000	Invisible exports	250,000,000
		Cost of living of 45,000,000 persons at £40 a head	1,800,000,000
Balance	150,000,000		
	£2,500,000,000		£2,500,000,000

Of course this is not exactly right. We are by

no means sure of some of the facts, and where we are sure only round figures have been taken; but it is sufficiently accurate for our purpose. Among other things we can see that there was probably a balance; that Britain was growing richer. Of course it is also possible that the people of the country were using a little more than is indicated and that the balance was less. We can also see what a large proportion of things we used came from outside of the British Isles, and what a large proportion of things made in this country were exported. About one quarter of the products of the work of people of Britain was exported and a somewhat greater proportion was imported. The value of money has decreased since 1907, and it is possible that our invisible exports when measured in terms of money in 1907 are lower than they were then and that our national balance is also less, but it is not likely that these proportions have greatly changed. In particular we may notice to what an extent we are still dependent on people outside Britain and people outside Britain are still dependent on us.

The truth is that the world is, more or less imperfectly perhaps, one great co-operative society. All its members belong to each other, and that which hurts one hurts all. A change in the way of doing things in one part of the world sooner or later affects the rest. We cannot live for a single hour, under modern conditions, without being indebted to thousands of toilers of whom we have never heard and of whom we too rarely think. And just as other people all over the world are working for us, so we too, in our turn, are working to help the same people wheresoever they live. We need other people; they need us. There is

no spot on the earth with which we have no concern, in whose inhabitants we have no interest. Whether we are conscious of it or not, the world is economically bound together by a million invisible threads.

And what happens when war breaks out? The union of nations is disturbed or destroyed; commerce across the ocean is at the mercy of the submarine, the warship, and the mine; productive power is destroyed, we have no work to pay for what we require, food supplies run short, and the poor suffer most of all. The commercial man, the merchant, is unable to pay his debts and banks stop payment. The great organisations which hold the world together get out of gear. There is loss of life, wounds, sickness, a lowering of the moral tone of the nation, and a loss of international friendliness which is perhaps the greatest loss of all.

We have striven to show how the world machine of commerce is a machine whose parts encompass the world. Nothing can so strain and weaken those parts as war. This book has dealt with *economic geography*, but there are many other interests, social, artistic, literary, with which we are not at present concerned. These are or ought to be world wide. 'The world is no longer divided into little circles of interest. The world no longer consists of neighbourhoods. The whole is linked together in a common life and interest such as humanity never saw before.'

It is on the basis of that understanding that the League of Nations has been built. It is not limited to this or that country or group of countries, and in the wide-world character of its organisation it attempts to meet a world-wide need.

BOOKS TO READ

Other Books in the 'New Era Library'

England in Her Days of Peace (Industrial History). E. Doorly.
Wealth and Work (Economics). G. Gough.

Man and His Work. A. J. Herbertson.
Man and His Markets. L. Lyde.
Man on the Earth. L. Lyde.
Man in Many Lands. L. Lyde.
Geography and World Power. J. Fairgrieve.
Man and His Conquest of Nature. M. Newbigin.
The Story of a Loaf of Bread. T. Wood.
Commerce and Industry. J. R. Smith.
Romance of Commerce. Newland.
The Newspaper. Dibblee.
Adventures amongst Hunters and Trappers. E. Young.
The Meaning of Money. H. Withers.

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- Its Evolution: Man & the Conquest of Nature

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IV ~~Soil in relation to~~
Adjustment of the world with Natural Provinces.

V Sources of Power + production of power - wind, water, coal, oil, ~~Petroleum~~ the Soil
VI The mineral world -
VII The animal kingdom Products Agriculture
VIII ~~Distribution of Population~~ IX Industry & trade
~~Productive and Its~~ - ~~Trade routes~~
Distribution of Population (races of the
means of Communication - trade rou

X Science for production & distribution of goods